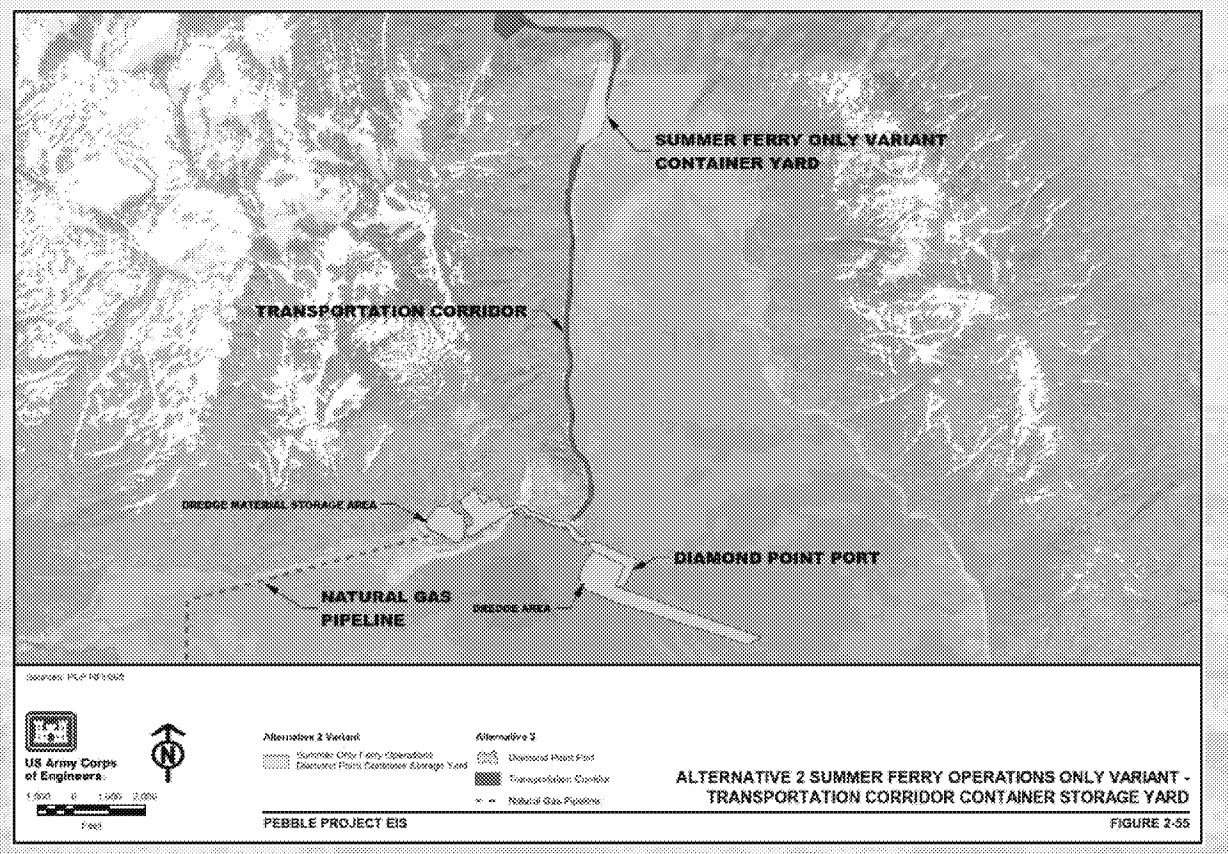
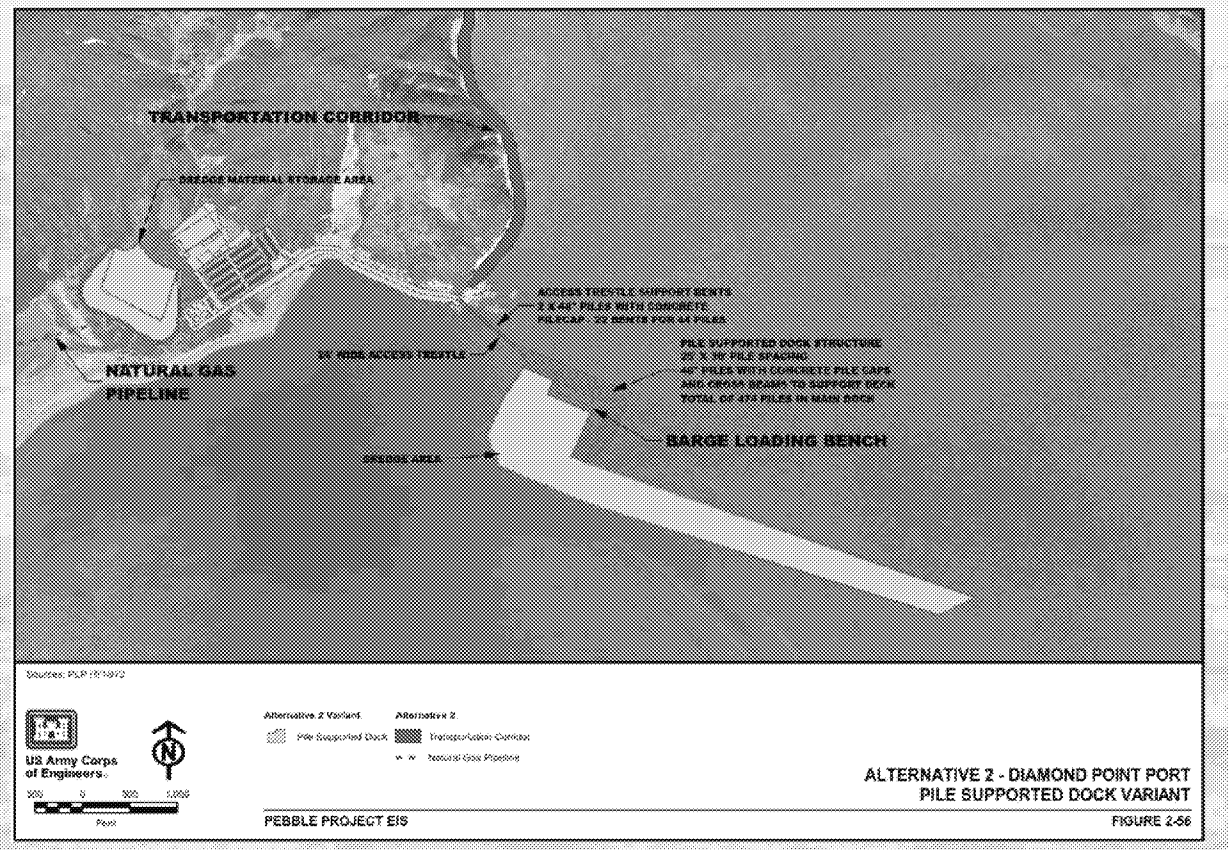
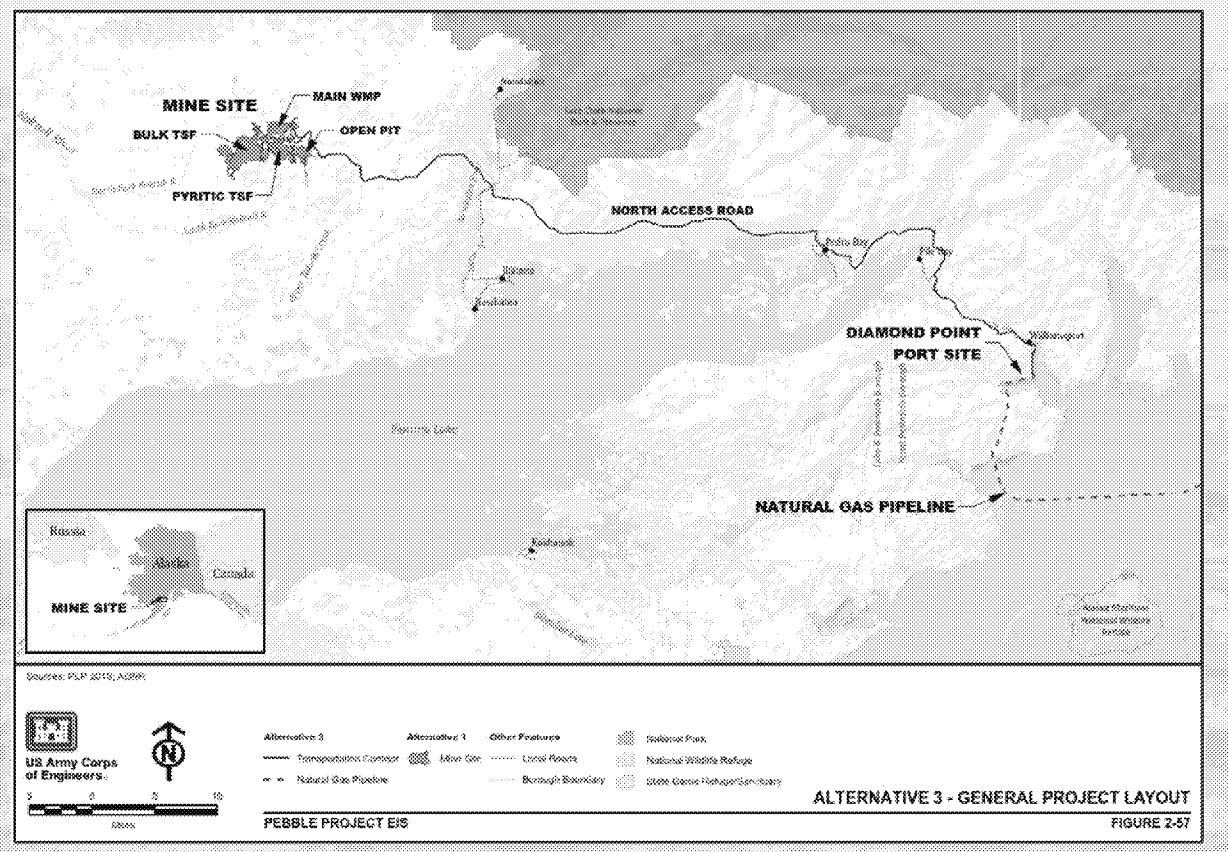
Action Alternative 2 – Summer Only Ferry Operations Variant



Action Alternative 2 – Pile Supported Dock Variant

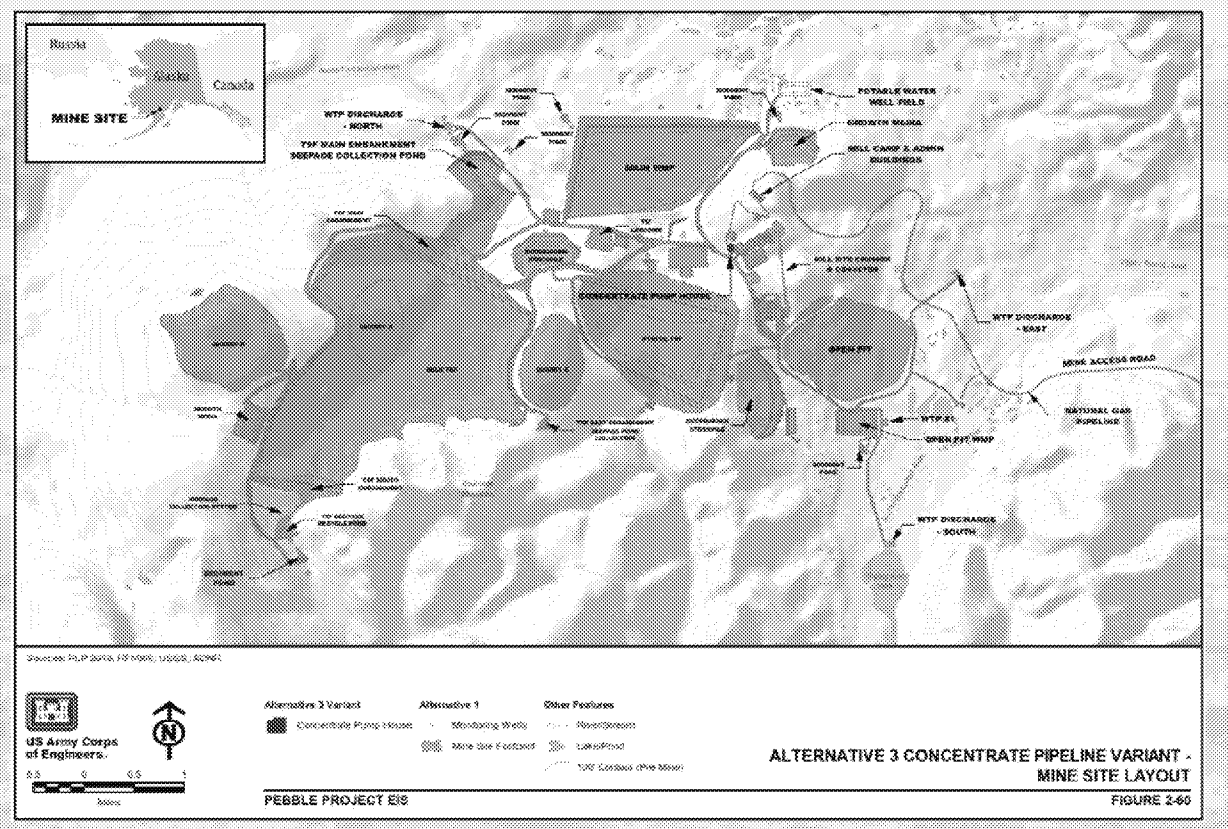


Action Alternative 3 – North Road Only

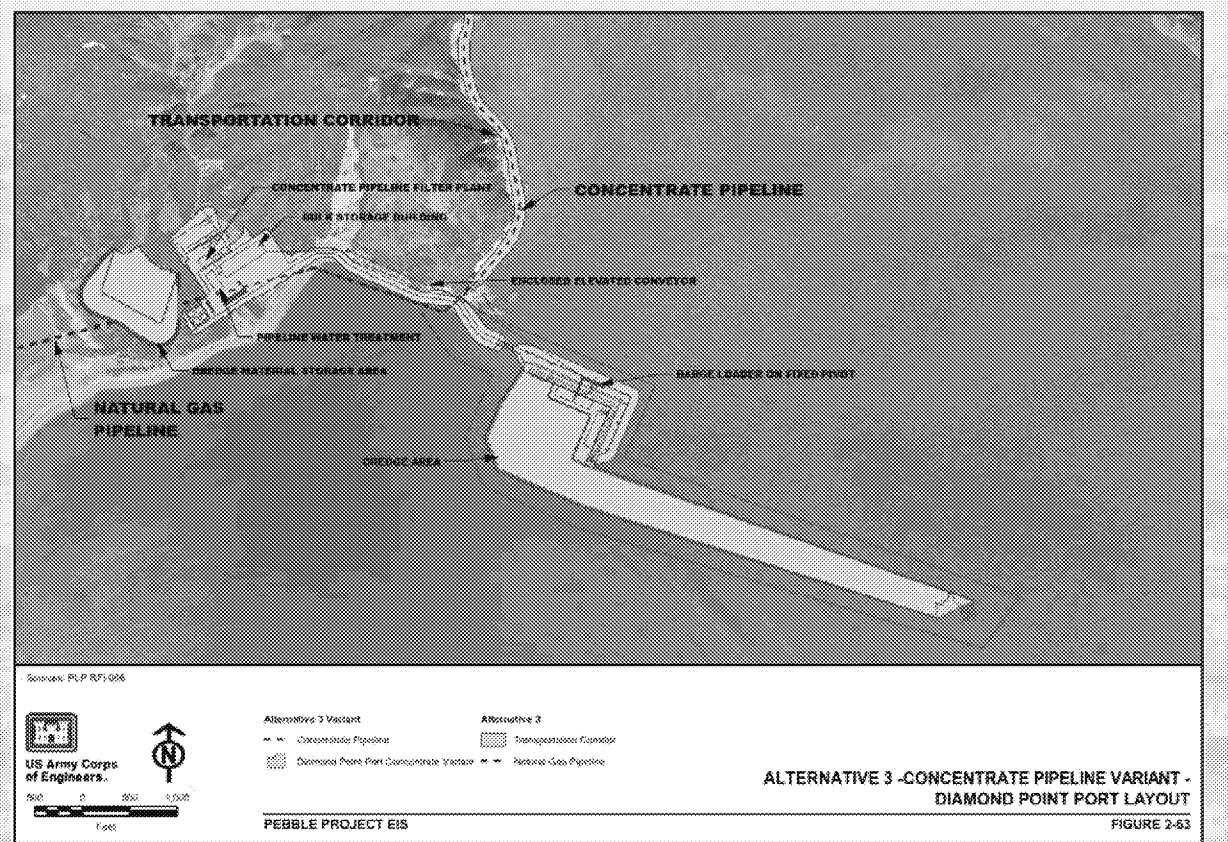


Action Alternative 3 – Concentrate Pipeline Variant

Includes two options: discharge water at Diamond Point and return water pipeline



Action Alternative 3 – Concentrate Pipeline Variant



Format and Level of Detail for Chapter 2

- Section 2.1 – Alternatives Development Process, references Appendix B – 1 Page
- Section 2.2 – Alternatives Carried Forward for Detailed Analysis
  - 30 to 35 pages of text
  - 64 figures
  - 23 Tables
  - Appendix N – PLP October 10, 2018 Project Description
- Section 2.3 – Alternatives Eliminated from Further Consideration – 6 pages

Update on Appendix B – Alternatives Development

- August 17, 2018 – Preliminary List of Options and Screening Criteria
  - Condensed version intended to solicit feedback on list of options and screening criteria
  - Comments received from one Cooperating Agency
  - Comments were considered when preparing the next version of Appendix B

Update on Appendix B – Alternatives Development

- September 14, 2018 – Alternatives Development Process
  - Screening criteria modified
  - Presented the screening analysis for each alternative
  - Comments from USACE and three Cooperating Agencies
    - Currently considering comments and revising the appendix (eliminated language referring to ability of mine operator to make profit)
    - Several additional options (e.g., 115,000 tons per day throughput, Pebble East, many additional TSF locations)
    - Several options were subject to additional consideration (e.g., underground mining, in pit processing and conveying, treating tailings to make inert)
  - Next version of Appendix B will be Draft EIS

Review of Select Alternatives

- Filtered Tailings (Dry Stack)
  - Applies to Bulk TSF only
  - Conventional slurry typically 20 to 40 percent solids
  - PLP proposes thickened tailings – approximately 55 percent solids
  - Dry stack alternative would filter to 80 to 85 percent solids
  - PLP responded to RFIs 054 and 076
  - AECOM mining experts reviewed RFIs – September 24 Memorandum
  - Dry stack is not technically practicable

Review of Select Alternatives

- Other Mine Locations
  - Appendix B looked at Whistler, Pyramid, and five massive sulfide deposits
  - Pebble East has been added – RFI 094
  - Whistler and the five sulfide deposits do not meet USACE overall purpose
  - Pebble East and Pyramid still under evaluation
- Underground Mining
  - RFI 094 – received from PLP October 18, 2018
  - Currently being evaluated by AECOM mining engineers

APPENDIX B – ALTERNATIVES DEVELOPMENT PROCESS

1.0 PURPOSE OF APPENDIX

This appendix further explains the alternatives development process for the Pebble Project; summarizes each step of the process; and provides the option screening criteria and results for evaluation of a reasonable range of alternatives in the Environmental Impact Statement (EIS).

1.1 CONTEXT AND REQUIREMENTS

The federal regulations governing the National Environmental Policy Act (NEPA) state in 40 Code of Federal Regulations (CFR) 1502 that the alternatives section "is the heart of the environmental impact statement." The regulations require federal agencies to "rigorously explore and objectively evaluate all reasonable alternatives and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." The Council on Environmental Quality (CEQ) guidance clarifies that:

> *In determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.* [1]

Alternatives screening is also pertinent to Clean Water Act (CWA) 40 CFR Part 230 Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (hereafter identified as 404(b)(1) guidelines), which require the analysis of practicable alternatives to the proposed discharge. The 404(b)(1) guidelines specify that:

> *Except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. (40 CFR 230.10(a)).*

The 404(b)(1) guidelines define a practicable alternative as one that is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CFR 230.10(a)(2)).

For actions subject to NEPA, where the U.S. Army Corps of Engineers (USACE) is the permitting agency, the analysis of alternatives required for NEPA environmental documents would in most cases provide the information for the evaluation of alternatives under the 404(b)(1) guidelines. The alternatives development process for the Pebble Project considers a broad range of alternatives in sufficient detail to address both NEPA and CWA Section 404(b)(1) requirements.

1.2 OVERVIEW OF THE ALTERNATIVES DEVELOPMENT PROCESS

Scoping yielded a wide variety of comments that provide input to the alternatives development process. The EIS team used a structured alternatives development process to recognize the project's large geographic footprint, the various project components, and the substantive input in scoping by the public, stakeholders, and agencies.

[1] Council on Environmental Quality, Executive Office of the President, Memorandum to Agencies: Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations. 46 Fed. Reg. 18026 (March 23, 1981) As Amended (1986).

To fully consider the wide range of issues identified in the scoping comments, this alternatives development process used the concept of "options," which consist of variations of components of the proposed project. For example, an option for transporting concentrate from the mine site could be a slurry pipeline instead of using trucks. Individual pipeline route variations would also be considered as options.

The four steps followed for alternatives development are summarized below.

Step 1: Developed the criteria for screening options to the proposed action. To narrow the range of options considered in detail in the EIS, criteria were organized around four screening tests. Each option must: 1) meet the purpose and need; 2) be reasonable; 3) be practicable in light of the overall project purpose; and 4) not increase adverse environmental impacts. The screening criteria are more fully described in Section 1.4, below.

Step 2: Identified options to address scoping concerns, compiled options that were suggested during the scoping process, and identified options that were previously evaluated by Pebble Limited Partnership (PLP) when developing the proposed project design. These options represented the initial range of alternatives and are identified in Table B-1, and organized by project component.

Step 3: Applied screening criteria from Step 1 to the options developed in Step 2. The criteria were used to determine reasonable options for detailed analysis in the EIS. Results of this screening are included in Table B-1, including rationale for the options dismissed from further analysis.

Step 4: Packaged options that met all of the screening criteria into viable action alternatives for detailed analysis in the EIS (i.e., an action alternative is a complete functioning project that includes power, a port, transportation, and mine site facilities).

1.3 SCREENING CRITERIA FOR THE FULL RANGE OF ALTERNATIVES

The EIS team screened options around four criteria, described below. The criteria screening steps were followed sequentially. If an option clearly did not meet one of the test-screening criteria, it was dismissed from further consideration, and did not proceed to the subsequent screening tests.

The objective of these criteria was to guide the screening process, but not to mechanically generate outcomes that substitute for professional judgment. By nature, these criteria were not fine filters. It was not the purpose of the option screening process to judge between trade-offs or make close calls, which would instead be addressed in the analyses within the EIS.

1.3.1 Screening – Purpose and Need

The project purpose and need is a key element of alternatives development. The purpose and need statements for the project are provided in Chapter 1 of the EIS.

The overall project purpose, determined solely by USACE, is used for evaluating practicable alternatives under the 404(b)(1) guidelines, and was therefore used as the first screening test. The overall project purpose must be specific enough to define the applicant's needs, but not so restrictive as to preclude discussion of a range of alternatives. USACE has determined that the overall project purpose is to develop and operate a copper-gold-molybdenum mine in Alaska in order to meet current and future demand for commodities, including copper, gold, and molybdenum.

Options that did not meet the USACE's determination of overall project purpose were dismissed from consideration as an action alternative option for evaluation in the EIS, and did not proceed to the subsequent screening test.

1.3.2 Screening – Reasonable Options

Screening criteria for reasonable options drew on the NEPA regulatory intent of reasonable alternatives, which includes those that are practical or feasible, using common sense. Options that would not pass this test of reason include:

- Those that are not practical because they would not provide a reasonable return on investment.
- Those that could not feasibly attain most of the basic objectives of the project.
- Those suggested during scoping that are not specific or are substantially similar to other options being considered.
- Those suggested during scoping that were based on a misunderstanding of the proposed project, regulations, or conclusions of other reports or studies.

This screening test for reasonable options is limited to the general factors listed above. Screening for technical, economic, and logistic considerations is included in the subsequent screening test for practicable options.

Options that were assessed as not reasonable were dismissed from consideration as an action alternative option for evaluation in the EIS, and did not proceed to the subsequent screening test.

1.3.3 Screening – Practicable Options

Only options that are determined to be practicable based on the 404(b)(1) guidelines can be considered by USACE during the permit decision process. Therefore, options that progressed through the screening criteria above were evaluated for practicability.

In terms of practicability, the 404(b)(1) guidelines provide a two-fold definition of a practicable alternative (40 CFR 230.10(a)(2)):

1. A practicable alternative is one that is available and capable of being done after taking into consideration cost, existing technology, and logistics.
2. The three practicability criteria (cost, existing technology, and logistics) apply in light of the overall project purpose.

Cost or economic practicability considers the relative cost effectiveness of technologically feasible and operationally efficient component options. If project costs of implementing an option exceed reasonable or practical limits, the option could be considered not practicable. In the screening stage, rough order-of-magnitude cost comparisons were made, because detailed engineering and costs could not reasonably be developed for each option. Where the order-of-magnitude cost review is not sufficient to decide whether an option is economically practicable, it would be advanced for additional review, and additional information would be gathered before reaching a screening conclusion.

The practicability considerations of existing technology and logistics are evaluated to minimize the risk of an option causing a component to be unable to perform its intended function efficiently. Options that make project components too complex or use unproven technology increase the risk of operational failure and accidents. Options identified for a specific project component may be subject to technical constraints that affect the workability of the option. For

example, topography, resource needs, spatial relationships of one component to another, temporal sequences, operating considerations, or engineering data for a specific option may influence whether a particular option is capable of meeting the project objectives. The existing technology and logistics criteria consider the ability of each option in meeting these challenges.

Options that were assessed as clearly not practicable in terms of cost, existing technology, and logistics in light of the overall project purpose were dismissed from consideration as an action alternative option for evaluation in the EIS, and did not proceed to the subsequent screening test.

1.3.4 Screening – Environmental Impacts

The 404(b)(1) guidelines require an evaluation of both practicability and environmental effects to determine whether there are practicable alternatives to the proposed project that would have less adverse impacts on the aquatic ecosystem, so long as the alternative does not have other significant environmental consequences (40 CFR 230.10(a)). Therefore, options that progressed through the screening criteria above were evaluated and compared for their relative extent and nature of impacts on the physical, biological, and socioeconomic environments.

Based on this assessment, options that have a high potential to increase the overall adverse environmental impacts or that add no environmental benefit compared to the Proposed Action were dismissed from further consideration as an action alternative option for evaluation in the EIS. Options that have potentially greater adverse impacts to one or more resources, but potentially fewer adverse impacts to other resources (i.e., trade-off of adverse impacts but may not be an overall increase), and options that clearly provide avoidance or minimization advantages (i.e., an environmental benefit) progressed as viable options to be evaluated as components of action alternatives in the EIS. Additionally, should two feasible options be generated to avoid or minimize an impact, but one of those options was determined to have potentially greater adverse impact on the environment—the option with greater impacts may be recommended for elimination from further study.

1.4 ALTERNATIVES DEVELOPMENT RESULTS

The USACE and cooperating agencies reviewed the outputs of each step in the alternative development process. The end result was to identify a reasonable range of action alternatives for full analysis in the EIS. PLP's proposed project is the proposed action for analysis in this EIS. Table B-1 provides details on the options considered, the screening results, and the status of each option (i.e., proposed action, alternative, or dismissed). The components and subcomponents of PLP's proposed action are included in Table B-1 for comparative purposes. Figure B-1 depicts the access and pipeline alignments considered. Figure B-2 illustrates the mine layout option considered.

The options that met screening criteria and marked as alternatives in Table B-1 were packaged into action alternatives (i.e., an alternative must be a functioning project and include power, a port, transportation, and mine facilities). As a result of this alternatives development process, two action alternatives were identified for detailed analysis in the EIS. The action alternatives vary from the proposed action in key engineering design, siting, and operational features. These alternatives address concerns raised in scoping and provide a reasonable range of alternatives for comparison. Action alternatives are described in Chapter 2 of the EIS.

NEPA regulations also require that a No Action alternative be analyzed. In this case, the No Action alternative would assume that the mine, transportation facilities, port, and pipeline would neither be permitted nor constructed as currently proposed.

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Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Location – Pebble Project / Deposit	LOC-001	***Origination*** – Pebble Limited Partnership (PLP) Proposed Action ***Description*** – The proposed project involves development of a copper-gold-molybdenum porphyry deposit (Pebble Deposit) located on state land in the Bristol Bay region of southwest Alaska.	☑ Proposed ☐ Alternative ☐ Dismissed
Location – Whistler Project	LOC-002	***Origination*** – Evaluation of alternative mine location options for mining copper, gold, and molybdenum was suggested during scoping. Based on the project Purpose and Need Statement "to develop and operate a copper-gold-molybdenum mine in Alaska in order to meet current and future demand for commodities, including copper, gold, and molybdenum," potential copper-gold-molybdenum porphyry and massive sulfide deposits in Alaska that are in exploration or advanced exploration were assessed. ***Description*** – The Whistler mineral property is a gold-copper porphyry deposit located in the Yentna mining district northwest of Anchorage. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Whistler was classified as an exploration-phase project by Giroux (2016). Exploration to date at the Whistler property has characterized 122 million tons (versus 6.5 billion tons of measured and indicated for Pebble) of resources (gold, copper, and silver) as indicated—no resources have been characterized as measured. Gold resources are estimated at 1.77 million ounces (oz), copper at 343 million pounds (lb), and silver at 6.13 million oz. To date, over 230,000 feet of core have been drilled, and exploration expenditures exceed $50 million. By comparison, exploration to date at Pebble has characterized 6.5 billion tons of measured and indicated resources; measured and indicated gold estimates are 70.6 million oz, copper at 56.9 billion lb, silver at 345 million oz, and molybdenum at 3.4 billion lb. (note that there are no molybdenum resources identified in the Whistler deposits); and PLP	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		expenditures to date on exploring and developing the Pebble Project are over $850 million. The Whistler property is not as advanced as the Pebble Project—no environmental, social, or community studies have been undertaken for the Whistler property; capital and operating costs have not been developed; and no economic analysis has been completed (Giroux 2016). Recommendations presented by Giroux (2016) are for additional exploration drilling throughout the Whistler deposits. The existence of the resources is too speculative (uncertain) and the scale of the potential resource is substantially smaller. Based on the exponential difference in resources and expenditures, it is concluded that this option is not reasonable because it is not economically feasible for PLP to acquire and develop the Whistler property. ***Why Dismissed*** – This option is not reasonable because it would not provide a reasonable return on investment.	
Location – Pyramid Project	LOC-003	***Origination*** – Evaluation of alternative mine location options for mining copper, gold, and molybdenum was suggested during scoping. See LOC-002 regarding Purpose and Need. ***Description*** – Pyramid is a copper-gold-molybdenum porphyry deposit located on the southwestern tip of the Alaska Peninsula southwest of Anchorage. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Pyramid was classified as an early-stage exploration project by SRK (2018). Exploration to date at the Pyramid property has characterized only inferred resources of 24.5 million tons of copper, 74 million tons of molybdenum, and 488,000 ounces of gold. Through 2017, the amount of core drilling at Pyramid was 42,100 feet, compared with over 1 million feet of core	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		drilling at Pebble. Therefore, it is concluded that this option is not reasonable because resources at Pyramid are inferred (speculative), but not measured/indicated; are exponentially less than those measured/indicated at the Pebble Project; and that based on the amount of money expended to date by PLP (over $850 million) to explore and develop the Pebble Project, it is not economically feasible for PLP to acquire and develop this property. ***Why Dismissed*** – This option is not reasonable because it would not provide a reasonable return on investment.	
Location – Outside of Alaska	LOC-004	***Origination*** – Evaluation of alternative mine location options for mining copper, gold, and molybdenum was suggested during scoping. ***Description*** –This option involves acquisition, development, and operation of a copper-molybdenum massive sulfide deposit located outside of Alaska. ***Screening*** – 1. Purpose and Need Test: Does not meet the U.S. Army Corps of Engineer's (USACE's) overall project purpose to develop and operate a copper-gold-molybdenum mine in Alaska. ***Why Dismissed*** – This option does not meet the purpose and need of the project.	☐ Proposed ☐ Alternative ☑ Dismissed
Location – within Alaska	LOC-005	***Origination*** – Evaluation of alternative mine location options for mining copper, gold, and molybdenum was suggested during scoping. ***Description*** –This option involves development and operation of a multi-metals massive sulfide deposit located in of Alaska. ***Screening*** – 1. Purpose and Need Test: Meets the Purpose and Need	**Status under review**

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		3. Reasonable Test: Five massive sulfide deposits in Alaska (Arctic, Delta, Niblack, Palmer, and Sun) were evaluated. Indicated resources ranged from 26 million tons (Arctic) to no indicated resources (Delta and Palmer). By contrast, for the Pebble deposit, over 12 billion tons of measured (591 million tons), indicated (6.5 billion tons), and inferred (4.9 billion tons) resources are reported. Therefore, it is concluded that this option is not reasonable because resources at the five massive sulfide deposits are at best indicated at 26 million tons, but mostly inferred (speculative); and are exponentially less than those measured/indicated at the Pebble Project. Based on the amount of money expended to date by PLP (over $850 million) to explore and develop the Pebble Project, it is not economically feasible for PLP to acquire and develop these properties. ***Why Dismissed*** – This option is not reasonable because it would not provide a reasonable return on investment.	
Layout – Mine Layout Option 3	LAY-001	***Origination*** – PLP's May 11, 2018 update changed the proposed mine layout to Mine Layout Option 3, which would be the basis for PLP's application moving forward. ***Description*** – This option is part of the Proposed Action, which is based on a mining plan that sends all ore directly to the mill. It has two separate Tailings Storage Facilities (TSFs); a lined pyritic TSF with space to store potentially acid-generating (PAG) waste in the North Fork Koktuli River (NFK) East site; and an unlined bulk tailing TSF in the NFK West site. A lined water management pond (WMP) would be situated in the NFK North site. The bulk TSF would have a dry closure. The pyritic tailings and PAG waste would be relocated to the pit lake at closure, and the pyritic TSF and WMP would be reclaimed. This option facilitates post-closure placement of PAG waste and pyritic tailings in the pit lake, and enables a higher efficiency for the storage of bulk tailings. This option removes the need to store low-grade ore and manage associated runoff, and provides greater	☑ Proposed ☐ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		water storage capacity for upset conditions. The WMP is downgradient of impacted areas, facilitating capture and storage of extreme runoff events. This option also allows for safe, passively managed long-term storage of the pyritic tails and PAG waste in the pit lake.	
Layout – Mine Layout Option 1	LAY-002	***Origination*** – This mine layout option was PLP's Proposed Action in the December 2017 Department of the Army (DA) permit application. PLP's May 11, 2018 update changed the proposed mine layout to Option 3 (LAY-001). ***Description*** – This option is based on a mining plan that requires stockpiling capacity for lower-grade ore (LGO) that is processed late in the mine life. A single TSF with separate cells for bulk and pyritic tailings would be constructed in the NFK West site, with an internal embankment between the cells. The pyritic TSF would be lined. The bulk TSF would not be lined. PAG waste and LGO would be stored in a lined facility in the NFK East site. The main WMP would be constructed north of the NFK East site. The bulk TSF would have a dry closure. The pyritic TSF would have a wet closure. The LGO/PAG waste storage facility would be reclaimed. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable mine layout option. 3. Practicable Test: This layout was originally part of PLP's proposed action, and is assumed practicable in terms of cost, existing technology, and logistics. 4. Environmental Impacts Test: This option would have a smaller WMP which would reduce the total footprint and impacts to wetlands. However, this option requires maintenance of the pyritic TSF in a subaqueous state, and seepage collection into perpetuity. The exposed LGO and PAG waste rock would also be likely to become acidic when exposed to the atmosphere, resulting in acidic drainage and increased metals leaching. There is significant public concern that	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		tailings could flow from a dam failure, and doubt that a TSF can be maintained in a subaqueous state into perpetuity. ***Why Dismissed*** – This option would increase overall adverse impacts. Although there would be a reduction in some impacts from the smaller WMP, the need to maintain the pyritic TSF and capture and treat seepage water into perpetuity makes this option more environmentally damaging than the proposed LAY-003. Additional water quality impacts would result from storing the LGO and PAG waste rock in open stockpiles. Although mitigation in the form of collecting and treating the water could be effective, preventing the LGO and PAG waste rock from becoming acidic is preferable.	
Layout – Mine Layout Option 2	LAY-003	***Origination*** – This mine layout option was evaluated by PLP when developing the proposed project design. ***Description*** – This option is based on a mining plan that would send all ore directly to the mill. The TSF would be constructed in the NFK West site, and consist of a single cell with an internal area to store the pyritic tailings so that they remain subaqueous. A lined WMP with space to store PAG waste would be constructed in the NFK East site. The tailings would have wet closure, and the WMP would be reclaimed. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable mine layout option. 3. Practicable Test: This option is practicable. It requires less fill material, because there is no internal embankment, and it requires that all tailings be maintained in a subaqueous state in perpetuity. There are no proven methods of segregating two tailings streams in one cell that would permanently keep the pyritic tailings separate from the bulk tailings during operations, while the TSF progressively increases in size, to prevent the co-mingling of the two supernatant waters, and prevent contact of the two entrained waters concurrently with maintaining the	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		flow-through seepage concept of the bulk TSF. 4. Environmental Impact Test: Seepage water quality for the main embankment would be impacted by the pyritic tails. Re-handling of the pyritic tails for storage in the pit lake would be precluded, and they would need to be maintained in a subaqueous state into perpetuity. The dam would need to be inspected and maintained into perpetuity to prevent dam failure and tailing flows. Removes need to store LGO and manage associated runoff. Provides greater water storage capacity for upset conditions. ***Why Dismissed*** – This option would increase overall adverse impacts from reduced seepage water quality and the requirement to maintain the TSF into perpetuity.	
Mine Size – EPA Restricted Mine Size	LAY-004	***Origination*** – An alternative suggested during scoping was to restrict the size of the mine to what the U.S. Environmental Protection Agency (EPA) found appropriate in the 2014 Watershed Assessment. ***Description*** – This option would restrict the size of the mine to what the EPA found appropriate in the 2014 Watershed Assessment. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This option is not reasonable because EPA did not make a determination in the Watershed Assessment that any of the three mine scenarios they considered would be "appropriate." ***Why Dismissed*** – This is option is not reasonable. See LAY-005, which considers the smallest mine size scenario EPA considered. LAY-004 is dismissed because the suggestion is based on a misunderstanding of the EPA Watershed Assessment, and is likely the same—or very similar to—LAY-005.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Mine Size – Smaller Mine Pit Size	LAY-005	***Origination*** – Consideration of a smaller pit mine size was evaluated by USACE as a potential means to reduce project footprint, as well as surface, water, and other environmental impacts. ***Description*** –This option examines the Pebble 0.25 mine scenario, the smallest mine size considered by the EPA in the 2014 Watershed Assessment. Under this option, 0.23 billion metric tons of ore would be mined, with a throughput of 31,100 metric tons per day (tpd). ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This option is not reasonable because it would not allow a profitable project, considering the investment in infrastructure that would be required. See TPD-002 for evaluation of the 50,000 tpd option. An optimization study showed that option TPD-002 would not have a positive net present value, due to the fixed infrastructure component of the costs. ***Why Dismissed*** – This option is not reasonable because it would not provide a reasonable return on investment. See also TPD-002.	☐ Proposed ☐ Alternative ☑ Dismissed
Mine Size – Larger Mine to Develop More of the Known Deposit	LAY-006	***Origination*** – Evaluation of options to maximize the potential economic benefits of developing the deposit, such as a larger and longer-lived mine, was suggested during scoping. ***Description*** –This option would increase the Mine Site and duration of operations to develop more of the known and inferred resource of the overall deposit. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: The proposed project would only develop 10 percent of the measured, indicated, and inferred resource. It is reasonable to consider if	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mine Location and Layout Options			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		additional resources can be developed without increased impact. 3. Practicable Test: Practicability is unknown at this time, but Northern Dynasty has communicated to shareholders that expanded development is possible (Northern Dynasty 2013). 4. Environmental Impacts Test: This option would increase environmental impacts by generating additional tails and other noneconomic material that would need to be stored on site. Additionally, the mine would operate longer, prolonging the duration of operations impacts. ***Why Dismissed*** – This option would increase overall adverse impacts. Although this option fails the test to be considered as an alternative in the Environmental Impact Statement (EIS), an expanded mine would be considered in cumulative effects in Chapter 4 of the EIS.	

Table B-1: Preliminary List of Project Options Being Considered

Mining			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Mining Type – Surface Mining	MNG-001	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which includes developing the resource using open pit mining methods.	☑ Proposed ☐ Alternative ☐ Dismissed
Mining Type – Underground Mining	MNG-002	***Origination*** – Underground mining was evaluated by PLP when developing the proposed project design, and was suggested for consideration during scoping. ***Description*** – This option would develop the resource using underground mining methods. The proposed project would develop the portion of the deposit that is close to the surface. If the mine were expanded in the future (see LAY-006), underground methods such as block caving would likely be proposed. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Evaluating underground mining methods is reasonable for an EIS. 3. Practicable Test: The portion of the Pebble Deposit proposed to be mined is at the surface, with minimal overburden or overlying waste rock. Underground mining of this portion of the deposit would be expected to result in a mine roof collapse, ground surface subsidence, and sinkhole formation. Existing underground mining techniques cannot be used to mine the proposed project because the remaining surface material would collapse. ***Why Dismissed*** – This option is not practicable using existing technology for the portion of the deposit that is proposed to be mined. Underground block caving is a method that would be considered in the future if mine expansion is proposed (PLP Request for Information [RFI] 062 Response). An expanded mine scenario is considered in the EIS, Chapter 4, under cumulative impacts.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mining			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Mining Type – Surface and Underground Mine	MNG-003	***Origination*** – A combination of surface and underground mining was evaluated by PLP when developing the proposed project design, and was suggested for consideration during scoping. ***Description*** – This option would develop the resource using both open pit and underground mining methods. The proposed project would develop the portion of the deposit that is close to the surface. If the mine were expanded in the future (see LAY-006), some combination of surface and underground methods would likely be proposed. See also MNG-002. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Evaluating a combination of surface and underground mining is reasonable for an EIS. 3. Practicable Test: The portion of the Pebble Deposit included in the proposed project is at the surface, with minimal overburden or overlying waste rock. Underground methods to include block caving of this portion of the deposit would be expected to result in a mine roof collapse, ground surface subsidence, and sinkhole formation. Existing underground mining techniques cannot be used to safely mine the proposed project because the remaining surface material would collapse. ***Why Dismissed*** – This option is not practicable using existing technology for the portion of the deposit that is proposed for mining. Underground block caving is a method that would be considered in the future if mine expansion is proposed (PLP RFI 062 Response). An expanded mine scenario is considered in the EIS, Chapter 4, under cumulative impacts.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mining			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Material Handling – Truck and Shovel	MNG-004	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which involves use of large shovels to load ore into haul trucks. The trucks would transport the ore from the pit to the crusher.	☑ Proposed ☐ Alternative ☐ Dismissed
Material Handling – In-Pit Crushing and Conveying	MNG-005	***Origination*** – In-pit crushing and conveying was evaluated by PLP when developing the proposed project design. PLP completed an engineering evaluation of in-pit crushing and conveying in response to RFI 032, which requested feasibility information for several project options. ***Description*** – This option would use in-pit crushing and conveying methods for material handling that would begin several years into the start of operations, and operate through the end of the mine life. This option would require the excavation of a dedicated crusher pocket and ramp to transport ore via a conveyor to the processing facility. The additional excavation associated with the crusher pocket and ramp would generate additional PAG waste, which would exceed the space available for PAG waste storage in the pyritic TSF, and require the development of a separate PAG waste storage facility. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable material handling option. 3. Practicable Test: In-pit crushing is a practicable material handling option, but it is more commonly implemented at some point later in mine life, as the open pit is developed, and the installed crushing and conveying system can remain stationary for an extended period. 4. Environmental Impacts: This option would provide only a limited net reduction in trucking, and therefore diesel consumption and emissions; but would increase the overall impacted footprint and wetland impacts because of the crusher pocket and	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mining			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		ramp infrastructure and the need to create a separate PAG waste storage facility. ***Why Dismissed*** – This option would increase overall adverse impacts, with only a limited net saving in terms of diesel fuel usage and net emissions.	
Truck Fuel – Diesel	MNG-006	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, in which large-haul trucks are equipped with diesel engines and would use most of the anticipated diesel supplies. This option requires the shipment of diesel to the Mine Site.	☑ Proposed ☐ Alternative ☐ Dismissed
Truck Fuel – Liquefied Natural Gas	MNG-007	***Origination*** – Liquefied natural gas (LNG) for truck fuel was evaluated by PLP when developing the proposed project design. Use of alternative truck fuel was also suggested during scoping. ***Description*** –Under this option, LNG would be produced using an on-site plant consisting of modules that could be trucked, and LNG storage tanks manufactured off site. An engineered footprint for the facility has not been developed, but it would have a footprint of approximately 1 acre, based on similar facilities reviewed. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Using LNG haul trucks is reasonable, because equipment manufacturers such as Caterpillar have been actively working to develop commercially available LNG-powered haul trucks. 3. Practicable Test: On-site production of LNG would be feasible because there would be a natural gas pipeline to the Mine Site and LNG plants of the size required are readily available and transportable. However, LNG-powered haul trucks are not commercially available for the mining industry, and are not proven to be viable on a production basis. There are currently no trucks available in the required size range.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Mining			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		Why Dismissed – This option is not practicable in terms of existing technology. LNG trucks can be considered later in the EIS process as a mitigation measure if this technology advances prior to completion of the EIS and Record of Decision.	

Table B-1: Preliminary List of Project Options Being Considered

Processing			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Facility Location/ Process Type – On-site Concentrate Production	PRO-001	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, in which the initial processing of ore would be conducted on site to produce a concentrate that would be transported off site for smelting. PLP estimates the annual production to be approximately 660,000 tons of copper-gold concentrate, and 16,500 tons of molybdenum concentrate.	☑ Proposed ☐ Alternative ☐ Dismissed
Facility Location– Off-site Ore Processing	PRO-002	***Origination*** – Off-site ore processing was evaluated by PLP as an option when developing the proposed project design. Evaluation of alternative locations for ore processing was also suggested during scoping. ***Description*** – Off-site ore processing would involve transporting all ore away from the project area for processing. This would involve transportation of 180,000 tons of ore from the mine site to the mill site daily. This would require approximately 100 times the proposed truck, ferry, lightering barge, and ship traffic. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider off-site transport if it would reduce the size and impact of mine site facilities such as the TSFs. 3. Practicable Test: Off-site processing presents a series of challenges in terms of cost and logistics, which likely make this option not practicable. Associated issues are as follows: • Introduces inefficiencies, because it requires the use of large amounts of energy and equipment to transport the non-mineralized portion of the ore. • Requires transportation of more than 100 tons of unprocessed rock every minute, which would require almost continuous truck traffic, 24 hours per day, every day of the year. • The increased amount of infrastructure required off site and for transportation	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Processing			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		purposes would broaden the project footprint. • Off-site processing would result in increased project costs. 4. Environmental Impact Test: There would be increased traffic and potentially additional infrastructure required to transport the rock, resulting in elevated air emissions, diesel consumption, visual impacts, noise levels, dust, wildlife impacts, and wetland impacts. Increases risk of accidents and spills caused by adverse road conditions, inclement weather, landslides, debris blockages, etc., that would require emergency vehicles, and could further impact the environment and temporarily block the transport corridor. ***Why Dismissed*** – This option would increase overall adverse impacts, and would likely not be practicable in terms of costs and logistics.	
Facility Location /Process Type – On-site Ore Processing (Metal Production)	PRO-003	***Origination*** – On-site metal processing was evaluated by PLP as an option when developing the proposed project design. ***Description*** – On-site ore processing would construct a smelter and produce metals on site (copper, gold, and molybdenum) instead of a concentrate product. On-site smelting would require additional land for the facility and disposal of smelting waste. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider this option if it would reduce transportation impacts. 3. Practicable Test: On-site ore processing is likely feasible in terms of technology, but smelting at a large, existing, established ore-processing facility would be much less expensive. 4. Environmental Impacts Test. On-site smelting would reduce trucking and ship traffic, but increase Mine Site air emissions. Increased air emissions would result	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Processing			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		from increased natural gas usage (thermal heating of the ore and increased power generation) and heavy metals escaping the ore heating step. The additional smelting and waste disposal facilities would increase wetland impacts. ***Why Dismissed*** – This option would increase overall adverse impacts.	

Table B-1: Preliminary List of Project Options Being Considered

Throughput			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
180,000 tons per day	TPD-001	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which includes mine throughput of 180,000 tpd over a 20-year mine life. It is a revision of the previously proposed 160,000-tpd throughput. A throughput of 180,000 tpd eliminates the need for a LGO/PAG storage facility, which would require 4 additional years of processing at the end of operations. This option reduces the mine footprint from the originally proposed 160,000-tpd throughput.	☑ Proposed ☐ Alternative ☐ Dismissed
50,000 tons per day	TPD-002	***Origination*** – This option was evaluated by PLP as an option when developing the proposed project design. ***Description*** – Mine throughput of 50,000 tpd, with a mine life of 71 years. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: An optimization study showed that this option does not provide a positive financial return. The small throughput of the 50,000-tpd project does not have a positive net present value, due to the fixed component of the costs. It is not reasonable to consider an option that would not provide a positive financial return. ***Why Dismissed*** – This option is not reasonable because it would not provide a reasonable return on investment .	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Throughput			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
160,000 tons per day	TPD-003	***Origination*** – This option was evaluated by PLP as an option when developing the proposed project design. ***Description*** – This throughput option of 160,000 tpd would require construction of a large, lined pad for storing PAG waste rock and LGO (PAG waste rock would be returned to the completed pit at closure and LGO would be processed during the later years of mine operations). This option was replaced by the 180,000-tpd throughput as the Proposed Action. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider this option because it was originally proposed by PLP. 3. Practicable Test: This plant is appropriately sized to efficiently process the targeted 1.5 billion-ton ore resource using a standard processing plant design and equipment. An optimization study has demonstrated that this option produced a positive financial return. 4. Environmental Impacts Test: This throughput option is based on previous project designs to store the LGO and PAG waste rock for processing in the last 4 years of operation. This design would create additional mine facility footprint that would need to be restored at the time of closure. There would be no change in the footprint of other mine and transportation facilities compared to the 180,000-tpd option. The LGO stockpile would generate poor-quality runoff water and seepage (acid rock drainage [ARD] and metals leaching) that would need to be collected, managed, and treated. ***Why Dismissed*** – This option would increase overall adverse impacts.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Throughput			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
320,000 tons per day	TPD-004	***Origination*** – This option was evaluated by PLP when developing the proposed project design. ***Description*** – Mine throughput of 320,000 tpd over an 11-year mine. It is assumed that this throughput option would result in the same mine pit and TSF footprint over a shorter period. Due to higher production levels, it would likely increase the size of the processing facilities; accelerate the tailings deposition rate and TSF embankments raise schedule; and increase the volume of concentrate transported over a shorter period of time. This in turn would increase the volume of truck and ferry traffic on the transportation system, and increase activities associated with the port facility, including the number of lightering and marine-ore transport vessels. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider higher throughput rates. 3. Practicable Test: Construction and commissioning of a new plant this size would present significant execution, manpower, logistical, cost management, and other challenges that elevate project risk. It would require additional processing facilities. The significantly shorter mine life is not long enough to ensure that project operations can pass through several economic cycles and potential fluctuation in metals prices. However, it is likely practicable. 4. Environmental Impacts Test: This option would cut the life of mine operations nearly in half, reducing the time period of operational impacts. The footprint of mine pit and TSFs would remain the same, but would require addition footprint for processing facilities. This throughput level would nearly double the volume of ore processed over the Proposed Action, increasing the volume of ore concentrate truck traffic on the road and ferry systems. It would also increase the frequency of activities associated with marine transport, including lightering operations and marine-ore ship traffic.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Throughput			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		Why Dismissed – Although this option would reduce the period of operations, it would increase overall environmental impacts, including the processing facility footprint, and truck, ferry, and marine operations traffic levels over the Proposed Action.	

Table B-1: Preliminary List of Project Options Being Considered

Gold Recovery			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Gravity	GR-001	***Origination*** – PLP Proposed Action ***Description*** – The proposed option is to use gravity separation methods to recover gold.	☑ Proposed ☐ Alternative ☐ Dismissed
Secondary Gold Recovery	GR-002	***Origination*** – The use of a cyanide leach circuit for ore recovery was examined by PLP and recommended for consideration in scoping comments as a means to increase the efficiency of ore recovery. ***Description*** –This option involves construction of a cyanide leach circuit at the Mine Site to process the pyritic tails. A cyanide leach circuit could recover additional gold from the process. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable option. 3. Practicable Test: Cyanide leaching is a common practice and would likely be technologically and economically feasible. 4. Environmental Impacts Test: Cyanide is toxic to aquatic organisms, wildlife, and humans. PLP has proposed to forgo a cyanide leach circuit and the additional gold recovery it would provide because of public concern for the use and transportation of cyanide. The leach facility would have a large footprint that would impact wetlands. ***Why Dismissed*** – This option would increase overall adverse impacts.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Power Source – Thermal (Burn Natural Gas)	POW-001	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which involves power generation using natural gas as a fuel source. PLP is proposing to build a power plant at the Mine Site with a capacity of 270 megawatts (MW). The plant would be fueled with natural gas delivered from the Kenai Peninsula to the Mine Site.	☑ Proposed ☐ Alternative ☐ Dismissed
Power Source – Renewable Energy	POW-002	***Origination*** – Renewable energy power options were evaluated by PLP when developing the proposed project design. ***Description*** – Under this option, PLP would construct and power the mine using renewable energy resources such as wind turbines and run-of-river (ROR) hydropower. Also considered under this option is supplementing the natural gas power plant production with renewables. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Using renewable energy is a reasonable option to consider. 3. Practicable Test: The two separate renewable options listed below were considered under this option. These options would supply power intermittently and in small quantities relative to the need, and would not eliminate the need for the proposed natural gas power plant and pipeline. These options would intermittently supply power that would decrease the demand on the proposed natural gas power plant, potentially resulting in decreased usage of natural gas. Both options would require additional access roads and ground disturbance to transmit power to the mine. • Wind – Wind energy generation is intermittent and must be paired with other energy sources or storage mechanisms to provide a stable, consistent supply. There are no identified wind energy resources in the vicinity capable of	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		providing a significant and consistent portion of the project energy. • ROR Hydropower – No suitable locations that could generate a significant amount of ROR hydropower could be identified. Additionally, in winter, rivers may freeze, making this power source intermittent, requiring additional energy sources. 4. Environmental Impacts Test: The construction of wind farms, ROR hydropower plants, and associated infrastructure would be additive to the proposed power plant and would increase the project footprint. The option likely would result in additional impacts to wetlands, wildlife, and aquatic resources, but potentially decrease emissions from burning natural gas. ***Why Dismissed*** – Although this option would potentially decrease the consumption of natural gas and associated emissions; it would not replace the need for the natural gas power plant and pipeline. The additional costs of building renewable energy systems for what would be supplemental power make the option not practicable. Also, the potential reduction in emissions does not appear to offset the likely additional impacts to wetlands, wildlife, and aquatic resources.	
Power Source – Purchase Power from Existing Grid	POW-003	***Origination*** – Purchasing power from the existing grid was evaluated by PLP when developing the proposed project design. ***Description*** – Under this option, power would be purchased from existing third-party providers and transmitted to the site via a High-Voltage Direct Current transmission. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Purchasing power is a reasonable option to consider. 3. Practicable Test: There is no significant power-generating capacity in the Cook Inlet area in general, and on the Kenai Peninsula in particular, to service the	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		anticipated project demand. Construction of additional generation capacity would be required regardless of where it is situated. This option is not practicable. ***Why Dismissed*** – The option is not practicable; there is no excess capacity in the existing grid.	
Power Source – Use Alternative Fuel Sources/Delivery Methods	POW-004	***Origination*** – Evaluation of alternative fuel sources and delivery methods was suggested during scoping due to concern with gas line leaks or ruptures, and potential long-term consequences that a subsea pipeline can have on the environment. ***Description*** – The most likely alternative energy sources would be diesel fuel and LNG, both of which could be delivered to the proposed Amakdedori Port via barge. Transportation from the port to the Mine Site could be by truck or pipeline. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Considering alternative energy sources is reasonable. 3. Practicable Test: Both diesel and LNG options are technologically feasible. The Donlin Gold Final EIS looked at a diesel power plant alternative and estimated that a similarly sized power plant (227 MW) would require approximately 80 million gallons of diesel per year. Use of diesel would require increased storage at the port, and a pipeline or 4,200 truck trips per year, each truck hauling three tank trailers. Diesel is readily available in Cook Inlet. Use of LNG would require a supply of LNG, a purpose-built LNG barge, and an LNG receiving terminal and storage tanks at Amakdedori. It would also require regasification at Amakdedori for transportation to the Mine Site by pipeline, or trucking LNG to a mine site storage tank where it would be regasified and fed to the power plant. The former ConocoPhillips LNG export facility in Nikiski has been sold and the	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		export permit was allowed to expire; and LNG is not currently barged in Alaska. 4. Environmental Impacts Test: Transporting an additional 80 million gallons of diesel increases the potential for spills. Emissions from the proposed power plant would be increased if diesel was used instead of natural gas. See also Section 4.21, which explains there would be few expected effects from natural gas pipeline leaks to soil or water bodies because the gas would dissipate rapidly. Use of LNG would avoid the need for the natural gas pipeline segment under Cook Inlet between the Kenai Peninsula and Amakdedori. ***Why Dismissed*** – Diesel would increase environmental impacts from spills and increased emissions. LNG is not practicable; it is not currently barged in Alaska, would require costly infrastructure; and provides no obvious benefit over the proposed natural gas pipeline, other than avoiding the segment between the Kenai Peninsula and Amakdedori. The EIS would assess the risk to the pipeline from seismic events.	
Power Plant Location – On-site	POW-005	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which includes construction of a new 270-MW power plant at the Mine Site to power the mine. This option would not require the construction of high-voltage transmission lines to the Mine Site.	☑ Proposed ☐ Alternative ☐ Dismissed
Power Plant Location – Off-site with High Voltage Transmission Lines	POW-006	***Origination*** – Off-site location of the power plant was evaluated by PLP when developing the proposed project design. ***Description*** –This option would require a new power plant to be built at an alternative location such as the Kenai Peninsula or Amakdedori. High-voltage transmission lines would be constructed and used to transmit the power to the Mine Site. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider off-site generation combined with high-voltage and transmission lines.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		3. Practicable Test: Off-site power production is technologically feasible. If power generation was located on the Kenai Peninsula, it would require high-voltage transmission lines via underwater cables crossing both Cook Inlet and Iliamna Lake; and overhead lines on the Kenai Peninsula, from Amakdedori to a south ferry terminal, and the North Shore Ferry Terminal to the Mine Site. Underwater cables would be more costly to install and maintain than a natural gas pipeline. Overhead lines would be subject to wind and ice buildup, resulting in potential reliability risks. Undergrounding the overland portions of the transmission lines would be cost-prohibitive, because undergrounding generally costs an–order-of magnitude greater than overhead lines, and would be more costly than the gas line. In addition, transmission losses occur over long distances, making this less efficient than a gas line to provide on-site generation. If power generation was located proximate to Amakdedori, similar issues would remain, but would be lessened, given the reduced distance. However, the gas line under Cook Inlet would still be required. In addition, off-site generation would not offer sufficient redundancy in the event of a disruption to the transmission line and associated power supply. This option is likely not practicable due to cost. 4. Environmental Impacts Test: Construction and operation of high-voltage transmission lines would result in greater visual impacts than a gas line. ***Why Dismissed*** – Off-site power production, although practicable considering technology, would be much more costly and does not provide the stability and reliability benefits that would come from on-site power production. In addition, overhead transmission lines, and possibly the power plant (depending on location) would result in increased visual impacts.	

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Gas Source – Pipeline to a Source on the Kenai Peninsula	POW-007	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action. Under this option, the proposed pipeline (about 177 miles in length) would tie in to the existing natural gas distribution system on the Kenai Peninsula and be routed to Amakdedori, and then follow the Transportation Corridor to the Mine Site. The pipeline would be on the bottom of Cook Inlet and Iliamna Lake, and would be 12 inches in diameter.	☑ Proposed ☐ Alternative ☐ Dismissed
Gas Source – Pipeline to a Source on the West Side of Cook Inlet	POW-008	***Origination*** – This option was evaluated by PLP when developing the proposed project design. ***Description*** – This option would follow an alternative route to the north to access existing natural gas supplies such as Beluga on the western side of Cook Inlet. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider a route that avoids crossing deep water in Cook Inlet. 3. Practicable Test: There is no accessible gas infrastructure, pipeline capacity, or available tie-in locations on the southwestern side of the Cook Inlet. A potential tie-in location on the western side would be at Beluga, approximately 170 miles to the north (requiring an approximately 250+ mile pipeline to accommodate terrain). 4. Environmental Impacts Test: Accessing existing gas supplies for this option would require crossing Lake Clark National Park; or if a subsea route, would increase the length of the pipeline route in critical habitat for the endangered Cook Inlet beluga whale and the threatened northern sea otter (compared to the proposed route). ***Why Dismissed*** – This option would increase overall adverse impacts.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Gas Source – Connect to Donlin Gold Gas Pipeline	POW-009	***Origination*** – Evaluation of an alternative pipeline route to connect with the natural gas pipeline for the proposed Donlin Gold Mine was suggested during scoping. ***Description*** –Under this option, the pipeline would follow an alternative route to the north, allowing it to connect to the proposed Donlin Gold natural gas supply pipeline. A tie-in route to the nearest point along the proposed Donlin Pipeline would be longer than 155 miles, and would cross at least 8 to 10 substantial rivers. Routing could avoid major mountain ranges. The proposed Donlin Gold Mine natural gas pipeline has not yet been constructed; timing for development and operation is not known. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider connection to the proposed pipeline given that Donlin Gold recently received federal permits for construction of the pipeline. 3. Practicable Test: The Donlin Gold Pipeline is planned to be 14 inches in diameter, serving a 230-MW power plant, based on an operating flow rate of 47 million standard cubic feet per day (mmscfd), with a design capacity of up to 73.1 mmscfd. The Pebble Project proposes a 270-MW power plant, which could more than double the necessary capacity of the pipeline, which would not be practicable given its design. ***Why Dismissed*** – The Donlin Gold Pipeline, as planned, is unlikely to provide sufficient natural gas capacity to support the Pebble Project and is therefore not practicable.	☐ Proposed ☐ Alternative ☑ Dismissed
Gas Source – Northern Gas Pipeline Route to Kenai Peninsula	POW-010	***Origination*** – Evaluation of a pipeline alignment north of Augustine Island was suggested during scoping due to concern that placing the pipeline near Augustine Island/Volcano would make it vulnerable to seismic and volcanic hazards. ***Description*** –Increasing the distance from Augustine Island by routing to the north is impracticable for the Amakdedori Port, but routing the pipeline to Diamond Point to the	☐ Proposed ☑ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
(Ursus Cove)		north would achieve the purpose of the suggested option. Access option ACC-014 considers a port at Diamond Point in Iliamna Bay; routing the pipeline to this port would achieve the goal of increasing separation from Augustine Island. The pipeline for access option ACC-014 would be routed into Ursus Cove, run overland to Cottonwood Bay, and then continue to Diamond Port. ***Screening*** **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable option for the North Access Route (ACC-002). 3. Practicable Test: Practicability – The route to Ursus Cove is relatively free of seabed obstructions and rock-like features all the way into the cove, compared to a route through Iliamna Bay to a proposed Diamond Point port. Rocks, boulders, and boulder-type features in Ursus Cove only appear much closer to the shore, which makes routing and installation safer and easier, and also allows for moored installation. A route to Amakdedori north of Augustine Island would place the pipeline approximately the same distance or closer to Augustine Island/Volcano than the proposed route, and therefore is not a practicable route to achieve the goal of this option. Access Options ACC-014 and ACC-015 evaluate port sites in Iliamna Bay, more than 20 miles north of Augustine Island. It is feasible to route the natural gas pipeline to that location. 4. Environmental Impacts Test: A route to Ursus Cove and then to Diamond Point would have additional impacts from the overland portion, but would have a shorter segment in Cook Inlet. The option represents tradeoffs and is carried forward for detailed analysis.	
Gas Source –	POW-011	***Origination*** – This option was evaluated by PLP as a conceptual route directly into	☐ Proposed

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Power			
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Northern Gas Pipeline Route to Kenai Peninsula (Direct Route to Iliamna Bay)		Iliamna Bay and Diamond Point. ***Description*** – Under this option, the pipeline route would follow a more direct route to Iliamna Bay and Diamond Point than POW-010. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider a more direct, shorter pipeline. 3. Practicable Test: A 12-inch-diameter subsea pipeline has a specific minimum curvature radius, and therefore a limited ability to navigate areas of the seafloor with dense obstructions. A direct pipeline route into Iliamna Bay is not practicable because of boulders and rocky seabed near to and into the bay that could not be avoided with this option. RFI 063 summarizes PLP's reconnaissance data for a direct route, which indicated the presence of—and progressive increase in—rocks, boulders, and rock-like features on the seabed. The concentration of rocks and boulders reaches its maximum density at the mouth of Iliamna Bay, and continues into the bay. The rock-prone area starts approximately 13 miles from the landing point, and is consistent to the landing point. It is interpreted that the rocks and boulders are likely from a combination of glacial outwash and ice-rafted deposits. ***Why Dismissed*** – This option is not practicable due to boulders and other seabed issues.	☐ Alternative ☑ Dismissed
Gas Source – Other	POW-012	***Origination*** – Evaluation of practicable alternatives for reducing the amount of natural gas pipeline that is installed in the Sterling Highway right-of-way, which is managed by the Alaska Department of Transportation and Public Facilities, was suggested during scoping. ***Description –*** The commenter requested evaluation of alternative pipeline routes, but did not suggest specific locations.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Power			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		Screening **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: PLP's Proposed Action in the December 2017 DA permit application included a gas pipeline alignment that would connect to existing infrastructure near Happy Valley on the Kenai Peninsula and travel south, paralleling the Sterling Highway for 9 miles to a compressor station near Anchor Point. PLP's May 11, 2018 update changed the pipeline origin point to a compressor station north of Anchor Point, removing the requirement for the first 9 miles of pipeline construction along the Sterling Highway. Therefore, this option is no longer reasonable, because it pertains to an old project design. ***Why Dismissed*** **–** This option is not reasonable because it is based on an old design.	

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Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Access Road – South Access Route (Road and Ferry)	ACC-001	***Origination*** – PLP Proposed Action ***Description*** – This road and ferry route option is part of the Proposed Action, which includes the construction of two double-lane roads as the main access route to the mine for the transportation of materials, equipment, and concentrate. Road route: The mine access road would go from the Mine Site to the North Shore Ferry Terminal Site (ACC-006) on the northern shore of Iliamna Lake. As a variant of the proposed action, an alternative ferry terminal site location would be considered just to the east of the proposed ferry terminal site in the bay: the North Shore East Ferry Terminal Site (ACC-006a). On the southern shore of Iliamna Lake, the port access road would go from the Kokhanok West Ferry Terminal Site (ACC-010) to the Amakdedori Port Site (ACC-013). As a variant of the Proposed Action, the port access road would go from the Kokhanok East Ferry Terminal Site (ACC-011) to the Amakdedori Port Site (ACC-013). This option would also include an Iliamna spur road (which would include a crossing of the Newhalen River) and a Kokhanok spur road (which would include a crossing of the Gibraltar River if the Kokhanok West Ferry Terminal Site is included). Ferry route: The route would include a ferry crossing of Iliamna Lake from north to south. Natural Gas Pipeline route: The natural gas pipeline would follow the mine and port access roads and ferry route. This option would require the following: Total miles of road: 77 (Kokhanok West Ferry Terminal); 72 (Kokhanok East Ferry Terminal) Miles of road from Mine Site to the North Shore Ferry Terminal Site: 29 Total number of stream crossings: 39 (Kokhanok West Ferry Terminal site to Amakdedori Port site); 30 (with variant Kokhanok East Ferry Terminal site to Amakdedori Port site)	☑ Proposed ☐ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		Total number of major river crossings: 2 (Kokhanok West Ferry Terminal site to Amakdedori Port site); 1 (with variant Kokhanok East Ferry Terminal site to Amakdedori Port site).	
Access Road – North Access Route (Road Only)	ACC-002	***Origination*** – Evaluation of an access road option north of Iliamna Lake to eliminate the need for a lake crossing was suggested during scoping. ***Description*** – This road-only route option was evaluated by PLP when developing the proposed design as an option that would not require a ferry to cross Iliamna Lake. Road route: The mine/port access road would stay north of Iliamna Lake, connect with the existing Pile-Bay Williamsport Road in the vicinity of Pile Bay, and then continue to the Diamond Point/Iliamna Bay Port Site (ACC-014) on Cook Inlet. The road would bypass all but 5 miles of the existing Pile Bay-Williamsport Road. The road would traverse approximately 1.7 miles of tidal flats between Williamsport and Diamond point. This option would eliminate the need for a spur road to Iliamna, because the route would cross an existing road that connects Iliamna with Nondalton, providing access to infrastructure at Iliamna. Ferry route: The route would not include use of a ferry. Natural Gas Pipeline route: The western portion of the natural gas pipeline would follow the road route. The eastern portion of the pipeline would follow a route overland between Cottonwood Bay and Ursus Cove. Concentrate Pipeline: A concentrate transport pipeline may be included with this option. This option would require the following: Total miles of road: 82 Number of stream crossings: 71 Number of major river crossings: 4	☐ Proposed ☑ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		Screening – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a route that PLP has evaluated and studied extensively and is a reasonable route. 3. Practicable Test: A road-only route provides the advantages of reliable year-round access, and minimizes the need to re-handle cargo/concentrates. The option may also allow the inclusion of a concentrate pipeline for the project. There is no need to build the associated infrastructure for a ferry. This option would provide access to Cook Inlet, which is generally accessible year-round. This option would require a large number of stream crossings. This option also crosses many wetlands. The route is also more mountainous than other access routes, traversing side slopes and crossing perpendicular to drainages, including crossings of larger streams and minor rivers. Five miles of the existing Pile Bay-Williamsport Road require improvements to accommodate large trucks. The Diamond Point/Iliamna Bay Port Site (ACC-014) and access road would be subject to tidal flat filling. The port would require some dredging to 20 feet of Mean Lower Low Water (MLLW) (RFI 063), and may require blasting for access roads. This location could not accommodate deep draft vessels, and would require lightering barges to transfer ore concentrate to deep-draft bulk ships anchored at mooring locations. 4. Environmental Impacts Test: This route would cross fewer wetland acres than a southern route (ACC-001), but more than a road and ferry northern route (ACC-003), resulting in a difference in acres of fill. The Iliamna Spur Road would be eliminated, reducing impacts along these road miles. The road portion from Pile Bay to Williamsport would require more maintenance compared to a southern	

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Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		route (ACC-001), given the steep terrain. This route would require more stream crossings than a southern route (ACC-001) or a road and ferry northern route (ACC-003). There would be less subsistence concerns and no lake navigation or transportation concerns compared to a road and ferry route (ACC-001 or ACC-003). The route would place mine traffic near Pedro Bay. The option represents tradeoffs, and is carried forward for detailed analysis. If a concentrate pipeline was also included, the footprint would be slightly larger, but there would be a decrease in truck traffic.	
Access Road – North Access (Road and Ferry)	ACC-003	***Origination*** – This road and ferry route option is a route evaluated by PLP while looking at routes that remain entirely north of Iliamna Lake. Use of the existing road and resources at Pile Bay and Williamsport was suggested during scoping. ***Description*** – Road route: The mine access road would stay north of Iliamna Lake from the Mine Site to the Eagle Bay Ferry Terminal Site (ACC-008) on the northern shore of Iliamna Lake. On the eastern shore of Iliamna Lake, the port access road would go from the Pile Bay Ferry Terminal Site (ACC-009) to the Diamond Point/Iliamna Bay Port site, using parts of the existing Pile-Bay Williamsport Road, continuing to the Diamond Point/Iliamna Bay Port Site (ACC-014) on Cook Inlet. This road would bypass all but 5 miles of the existing Pile Bay-Williamsport Road. The road would traverse approximately 1.7 miles of tidal flats between Williamsport and Diamond Point. This option would eliminate the need for a spur road to Iliamna, because the route would cross an existing road that connects Iliamna with Nondalton, providing access to infrastructure at Iliamna. Ferry route: The route would include a ferry crossing of Iliamna Lake from west to east. Natural Gas Pipeline route: The natural gas pipeline would follow the road alignment for	☐ Proposed ☑ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		ACC-002 because Iliamna Lake is too deep on the eastern side of the lake for laying the pipeline on the bottom (the steep underwater cliffs would stress the pipeline bends). The eastern portion of the pipeline would follow a route overland between Cottonwood Bay and Ursus Cove. This route was proposed as an option by PLP. This option would require the following: Total miles of road: 50 Number of stream crossings: 34 Number of major river crossings: 1 ***Screening –*** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a route that PLP has evaluated and is a reasonable route. 3. Practicable Test: Thicker lake ice on the eastern side of the lake would make ferry operation more challenging; however, feasibility has been demonstrated by the long-term operation of an ice-breaking ferry on Williston Lake in British Columbia. Water depth and lakebed topography may preclude the use of a sub-lake gas pipeline along this alignment. Five miles of the existing Pile Bay-Williamsport Road require improvements to accommodate large trucks. The Diamond Point/Iliamna Bay Port Site (ACC-014) and access road would be subject to tidal flat filling. The port would require dredging to 20 feet of MLLW (per RFI 063), and may require blasting for access roads. This location could not accommodate deep-draft vessels, and would require lightering barges to transfer ore concentrate to deep-draft bulk ships anchored at mooring locations.	

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		4. Environmental Impacts Test: This route would cross fewer wetland acres than a southern route (ACC-001) or an all-road northern route (ACC-002), resulting in fewer acres of fill. The Iliamna Spur Road would be eliminated, reducing impacts along these road miles. The road portion from Pile Bay to Williamsport would require more maintenance compared to a southern route (ACC-001), given the steep terrain. The addition of a ferry route would require construction of two ferry terminals, resulting in placement of fill, and also resulting in greater transportation and potential navigation concerns along the ferry route in the eastern portion of the lake. There would be subsistence concerns with the ferry route being in areas important for subsistence seal harvesting. The option represents tradeoffs, and is carried forward for detailed analysis. The route would place mine traffic near local communities, including Iliamna, Nondalton, Pedro Bay, and Pile Bay. Additional transfer of materials with barges increases the risk of spills or loss of fugitive material during transfer operations.	
Access Road – West Access Route	ACC-004	***Origination*** – This road option is a road-only access route evaluated by PLP when developing the proposed design as an option that would not require a ferry to cross Iliamna Lake. ***Description*** – Road route: The road would go from the Mine Site around the western end of Iliamna Lake and continue to the Amakdedori Port site on Cook Inlet. This option would also include an Iliamna spur road. Ferry route: This option would not require a ferry. Natural Gas Pipeline route: The natural gas pipeline would likely follow the road.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		Concentrate Pipeline: A concentrate transport pipeline may be included with this option. This option would require the following: Total miles of road: 160 Total number of stream crossings: 129 Total number of major river crossings: 4 ***Screening*** **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider routing the road around the western end of Iliamna Bay. 3. Practicable Test: A road-only route provides the advantages of reliable year-round access, and minimizes the need to re-handle cargo/concentrates. The option would also allow the inclusion of a concentrate pipeline for the project. There is no need to build the associated infrastructure for a ferry. This option would provide access to Cook Inlet, which is generally accessible year-round. This option has a longer road footprint, with more wetlands and streams crossed. 4. Environmental Impacts Test: This access route has the highest occurrence of wetlands, with the highest environmental impact to wetlands. If a concentrate pipeline were also included, the footprint would be slightly larger. ***Why Dismissed*** **–** This option would increase overall adverse impacts.	
Access Road – Bristol Bay Access Route	ACC-005	***Origination*** **–** Evaluation of alternative port sites was suggested during scoping due to concerns with the potential ecological impact of the project. ***Description*** **–** This road option is a road-only access route that was evaluated by PLP	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
(Road Only)		when developing the proposed design as an option that used port sites other than Cook Inlet. Road route: The road would go from the Mine Site to a port site on Bristol Bay. Ferry route: This option would not require a ferry. ***Screening*** **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider alternative port locations. 3. Practicable Test: This would be the longest road route option. Construction of the associated port would have the potential for logistical conflicts with fishing operations in Bristol Bay. Additionally, Bristol Bay is ice-bound for a large portion of the year. Because Bristol Bay is shallow, a long trestle or causeway into the bay would be required; or alternatively, lightering to a moored bulk vessel. 4. Environmental Impacts Test: This option would have increased impacts associated with the construction of a port road, and the longest road route. Resulting impacts include increased emissions and visual impacts. The route would traverse mainly lowlands, which would have more impact to wetlands. There would be impacts to local residents in communities near the road. ***Why Dismissed*** **–** This option would increase overall adverse impacts.	
Ferry Terminal Location – North Shore Ferry Terminal	ACC-006	***Origination*** **–** PLP Proposed Action ***Description*** **–** This ferry terminal site option is part of the Proposed Action, which includes the construction of a ferry terminal on the northern shore of Iliamna Lake for an ice-breaking ferry to transport materials, equipment, and concentrate across the lake. The ferry route would be north-south. This location is associated with the South Access Route (Road and Ferry): ACC-001. As a variant to this option, an additional site slightly to the east in the same bay as the North Shore Ferry Terminal is included: the North Shore East	☑ Proposed ☐ Alternative ☐ Dismissed

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		Ferry Terminal Site variant. This option would include the following: Number of ferry miles to Kokhanok West Ferry Terminal Site (ACC-010): 19 Number of ferry miles to Kokhanok East Ferry Terminal Site (ACC-011): 25	
Ferry Terminal Location – North Shore East Ferry Terminal	ACC-006a	***Origination*** – Evaluation of this ferry terminal location was suggested during scoping. ***Description*** – This ferry terminal site option is a variant of the Proposed Action, which includes the construction of a ferry terminal on the northern shore of Iliamna Lake for an ice-breaking ferry to transport materials, equipment, and concentrate across the lake. The ferry route would be north-south. This location is associated with the South Access Route (Road and Ferry): ACC-001. The site is slightly east of the North Shore Ferry Terminal Site (ACC-006) in the same bay. ***Screening – This option is currently being evaluated.***	**Status under review**
Ferry Terminal Location – Iliamna and Kokhanok Ferry Terminals	ACC-007	***Origination*** – Evaluation of ferry terminals closer to existing infrastructure was suggested during scoping to reduce impacts to Gibraltar River and Upper Talarik Creek. ***Description*** – Under this option, the North Shore Ferry Terminal would be located in or near the communities of Newhalen and Iliamna, but away from the Newhalen River. The Iliamna spur road would therefore be the main mine access road route to connect the Mine Site to this ferry terminal. This option location could be included with South Access Route (Road and Ferry): ACC-001. The South Shore Ferry Terminal would be located north of the Kokhanok airport. The road from this ferry terminal to Amakdedori Port would follow a route similar to that described under ACC-001 for the Kokhanok East Terminal Site variant to avoid crossing the Gibraltar River. The ferry route would be north-south, and approximately 21 miles. This option location could be included with South Access Route (Road and Ferry): ACC-001.	☐ Proposed ☐ Alternative ☑ Dismissed

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		Screening **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider options that have potential to avoid and minimize impacts. 3. Practicable Test: Ice conditions and water depth at Iliamna are not suitable for a ferry terminal. Existing community use of the area may not be compatible with ferry route and a terminal. 4. Environmental Impacts Test: There would be additional impacts to the communities of Iliamna, Newhalen, and Kokhanok caused by changes in vessel traffic impacting current vessel and floatplane use, and heavy mine trucks traversing through the community. This location is closer to high-use areas for subsistence seal harvesting. ***Why Dismissed*** **–** This option would increase overall adverse impacts.	
Ferry Terminal Location – Eagle Bay Ferry Terminal	ACC-008	***Origination*** **–** This ferry terminal option was evaluated by PLP when developing the proposed design as an alternative North Shore Ferry Terminal location suitable for either a north-south lake transit or an east-west transit. ***Description*** **–** Under this option, the North Shore Ferry Terminal would be located in Eagle Bay. A road would connect the Mine Site to the terminal. A spur road to Iliamna would not be included in this option because the mine access road would cross the existing road from Iliamna to Nondalton, and provide community access. This option location is associated with the North Access Route (Road and Ferry): ACC-003. The location could be included with South Access Route (Road and Ferry): ACC-001. This option would include the following:	☐ Proposed ☑ Alternative ☐ Dismissed

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		Number of ferry miles to Kokhanok West Ferry Terminal Site (ACC-010): 24 Number of ferry miles to Kokhanok East Ferry Terminal Site (ACC-011): 27 Number of miles to Pile Bay Ferry Terminal Site (ACC-009): 33 ***Screening*** **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This location appears to be a reasonable option, with ability to accommodate ferry traffic and road connection. 3. Practicable Test: This location is sheltered for ferry operations and protected from prevailing winds. There may be navigability issues associated with the water depth in the area. Ice in the bays is thicker and more persistent than in the open lake west of Newhalen. This option minimizes the road footprint in the Upper Talarik Creek drainage. 4. Environmental Impact Test: This site may have different or additional impacts, such as shallower water, persistent ice in Eagle Bay, and more navigational hazards.	
Ferry Terminal Location – Pile Bay Ferry Terminal	ACC-009	***Origination*** **–** This ferry terminal option was evaluated by PLP when developing the proposed design. ***Description*** **–** This option considers an eastern shore ferry terminal location suitable for use with a northern access route, and the Eagle Bay Ferry Terminal as a western ferry terminal site. This option location is associated with the North Access Route (Road and Ferry): ACC-003. This option would include the following: Number of ferry miles to Eagle Bay Ferry Terminal Site (ACC-008): 33	☐ Proposed ☑ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		Screening – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is an existing port facility and reasonable to consider. 3. Practicable Test: There may be navigability issues associated with the water depth in the area. Ice in the bay may be more persistent than in the open lake to the west. This location would use portions of existing infrastructure and the more sheltered port location at Diamond Point. 4. Environmental Impacts Test: There may be possible impacts to subsistence seal harvesting, and additional impacts to the community of Pile Bay.	
Ferry Terminal Location – Kokhanok West Ferry Terminal	ACC-010	***Origination*** – PLP Proposed Action ***Description*** – This ferry terminal option is part of the Proposed Action, which includes the construction of a ferry terminal on the south shore of Iliamna Lake for an ice-breaking ferry to transport materials, equipment, and concentrate across the lake to a port site on Cook Inlet. The ferry route would be north-south. The south ferry terminal would be at the Kokhanok West Ferry Terminal Site, approximately 5 miles west of Kokhanok. This option would include a Kokhanok spur road. This option is associated with the South Access Route (Road and Ferry): ACC-001.	☑ Proposed ☐ Alternative ☐ Dismissed
Ferry Terminal Location – Kokhanok East Ferry Terminal	ACC-011	***Origination*** – Evaluation of alternative ferry terminal locations was suggested during scoping. ***Description*** – This ferry terminal option was evaluated as a variant of the Proposed Action for an alternative southern shore ferry terminal location. The south ferry terminal would be approximately 5 miles east of the community of Kokhanok at the Kokhanok East Ferry Terminal Site. This option would include a Kokhanok spur road. This option is associated as a variant of the South Access Route (Road and Ferry): ACC-001. The port access road would follow a shorter route (5 miles shorter) than from ACC-010 to the Amakdedori Port Site, and would not require a crossing	**Status under review**

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		of the Gibraltar River. ***Screening – This option is currently being evaluated.***	
Ferry Terminal Location – Utilize Alternative Ferry Terminal Sites	ACC-012	***Origination*** – Evaluation of alternative ferry terminal locations was suggested during scoping. ***Description*** – The suggested option requested consideration of alternative ferry sites and locations compared to the Proposed Action, but did not specify locations. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: The six ferry terminal options described in this table are the most feasible locations, and cover a variety of logistical and environmental considerations. This option is not reasonable to carry forward because other substantially similar—but more specific—locations are being considered, meeting the intent of the scoping comment. ***Why Dismissed*** – Several ferry terminal location options were developed and incorporated into this table. This option is not reasonable to carry forward because other substantially similar—but more specific—locations are being considered, meeting the intent of the scoping comment.	☐ Proposed ☐ Alternative ☑ Dismissed
Port Location – Amakdedori Port Site	ACC-013	***Origination*** – PLP Proposed Action ***Description*** – This port site option is part of the Proposed Action, which includes the construction of a port on Cook Inlet to transfer diesel fuel, materials, equipment, and concentrate using barges. The port location would be at Amakdedori. This option is associated with the South Access Route option (Road and Ferry): ACC-001. This port site would use the Offshore Lightering-Amakdedori option (ACC-022).	☑ Proposed ☐ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Port Location – Diamond Point/Iliamna Bay Port Site	ACC-014	***Origination*** – Evaluation of an option for a port site at Diamond Point in Iliamna Bay was suggested during scoping. ***Description*** – This port site option was examined by PLP in the process of developing the Proposed Action. The port site would be located at Diamond Point in Iliamna Bay. This port site option is associated with the North Access Routes (ACC-002 and ACC-003). This port site would use the Offshore Lightering-Iniskin option (ACC-023). The approach at the Diamond Point port would use a channel for barges and tugs to access the loading dock, requiring dredging to a depth of 20 feet MLLW (per RFI 063). Channels are typically more prone to sedimentation, requiring maintenance dredging; therefore, greater under-keel clearance is recommended compared to the depth of 15 feet MLLW described at the Amakdedori Port Site (ACC-013). Dredged material would either be used in construction of the causeway and dock, or disposed of onshore. The total volume of dredged material for the 20 feet MLLW channel is 650,000 cubic yards, of which a minimum of 50 percent is estimated to be used in the barge dock construction, which would require approximately 615,000 cubic yards of fill for construction. Any rocks encountered in the channel would be moved to the side of the channel, or used in the dock construction. Any remaining dredged material and any material from maintenance dredging would be disposed of on-shore in a bermed facility on uplands west of the dock site. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Diamond Point appears to be a reasonable option. 3. Practicable Test: The port location is sheltered, and access for this option could use portions of the existing Pile Bay Road. The port site and access road includes construction and placement of fill in the intertidal zone in Iliamna Bay. The port	☐ Proposed ☑ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		would require initial and maintenance dredging and blasting for access roads. This location could not accommodate deep-draft vessels, and would require lightering barges to transfer ore concentrate to deep-draft bulk ships anchored at mooring locations. 4. Environmental Impacts Test: This option uses some areas already impacted by development, and may avoid bear migration areas. Dredge and fill impacts would be greater in the intertidal zone.	
Port Location – Knoll Head/Iniskin Bay Port Site	ACC-015	***Origination*** – This port site option was examined by PLP in the process of developing the Proposed Action. ***Description*** – This port site would be located at Knoll Head in Iliamna Bay, and is associated with the North Access Routes (ACC-002 and ACC-003). This port site would use the Offshore Lightering-Iniskin option (ACC-023). ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider alternative port locations. 3. Practicable Test: This option requires challenging access and port site construction, and would require significant earthworks with associated impacts. This option would have prohibitive road construction cost. 4. Environmental Impacts Test: Access to this port would require crossing Iliamna Bay via a causeway, and includes substantial placement of fill in the intertidal zone in Iliamna Bay and Iniskin Bay. ***Why Dismissed*** – The environmental impacts would be greater than the Proposed Action (and ACC-014 – Diamond Point).	☐ Proposed ☐ Alternative ☑ Dismissed
Port Location – Fortification	ACC-016	***Origination*** – This port site option was examined by PLP in the process of developing the	☐ Proposed ☐ Alternative

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Bluff/Rocky Point Port Site		Proposed Action. ***Description*** – Under this option, the port location would be at Fortification Bluff/Rocky Point, which is approximately 15 miles north of Amakdedori, and would require 26 additional road miles from the port access road route to this port site, compared to the Proposed Action (ACC-001). This option is associated with the South Access Route option (Road and Ferry): ACC-001. The natural gas pipeline would not be co-located along the road, and would be routed through Amakdedori as described in ACC-001. This port site would use the Offshore Lightering-Amakdedori option (ACC-022). ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider other port locations. 3. Practicable Test: This option requires a longer access road and more challenging port site construction than other options, which would increase the total amount of road construction for the project. Shore approach routing options for the gas pipeline are not available due to the proximity to Augustine volcano. This option has a requirement for a steep access road to the shore that poses operational safety challenges. 4. Environmental Impacts Test: Baseline data indicate that this offshore area is a more a productive habitat with higher utilization by a wider variety of species than other options. ***Why Dismissed*** – This option would increase overall adverse impacts.	☑ Dismissed
Port Location – Williamsport Port	ACC-017	***Origination*** – Use of the existing road and resources at Pile Bay and Williamsport was suggested during scoping.	☐ Proposed ☐ Alternative

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Site		***Description*** – This port site option was examined by PLP in the process of developing the Proposed Action. The port location would be at the existing Williamsport location in Iliamna Bay. This port site option would be included with the North Access routes (ACC-002 and ACC-003) and may include the Eagle Bay Ferry Terminal Site (ACC-008) and Pile Bay Ferry Terminal Site (ACC-009) options. This option would require improvements to the existing port facilities. This port site would use the Offshore Lightering-Iniskin option (ACC-023). ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider use of existing facilities. 3. Practicable Test: Williamsport is inaccessible by sea except for brief periods at the peak of extreme high tides, which occur a few days each month (USACE 1995). A 1995 Environmental Assessment by USACE (Navigation Channel Feasibility Report and Environmental Assessment: Williamsport) indicates that a considerable amount of initial and ongoing maintenance dredging would be required to accommodate barges between the mouth of Iliamna Bay and Williamsport. The existing sea bottom is 2 or 3 feet above MLLW near the landing, and it would be necessary to dredge 22 to 23 feet of material to obtain the desired depth of -20 feet MLLW. The dredged material would need either onshore or offshore disposal. Existing uses of Williamsport may not be compatible with the level of activity proposed by PLP. 4. Environmental Impacts Test: This option would have increased adverse environmental impacts from the dredging and disposal of the dredged material in comparison with the Proposed Action (ACC-013) or the Diamond Point option	☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		(ACC-014). ***Why Dismissed*** – This option would increase overall adverse impacts.	
Port Location – Utilize Alternative Port Sites	ACC-018	***Origination*** – Using alternative port sites was suggested during the scoping period. ***Description –*** The commenter requested consideration of alternative port sites and locations compared to the Proposed Action, but did not suggest specific locations. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: The five port site options described in this table are the most feasible locations, and cover a variety of logistical and environmental considerations. The suggested option is not reasonable because it is not specific; however, the intent of the suggestion is fulfilled through evaluation of ACC-013 through ACC-017. ***Why Dismissed*** – Several port site options were considered (see ACC-013 through ACC-017). This non-specific option is not a reasonable option, and can therefore be dismissed in favor of the five location-specific options.	☐ Proposed ☐ Alternative ☑ Dismissed
Dock Type – Fill Dock	ACC-019	***Origination*** – PLP Proposed Action ***Description*** – PLP has proposed to construct a fill dock and sheetpile bulkhead at the port location.	☑ Proposed ☐ Alternative ☐ Dismissed
Dock Type – Pile-Supported Dock	ACC-020	***Origination*** – USACE is evaluating an option for a pile-supported dock to satisfy requirements for minimization of impacts to Waters of the U.S. ***Description*** – This option would construct a pile-supported dock rather than a fill dock at the port site. ***Screening – This option is currently being evaluated.***	**Status under review**

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Port Operations–Shore-Side Loading	ACC-021	***Origination*** – Shore-side loading was evaluated by PLP when developing the proposed project design. ***Description*** – This type of loading was originally proposed as an option by PLP when developing the Proposed Action, but was eliminated in project design updates in May 2018. Bulk carriers would be loaded directly at the port site (rather than at lightering locations), and would require a deep draft navigation channel and turning basin of approximately 50 feet of water depth. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable option. This was PLP's original proposed action, so is assumed to be economically and technologically feasible. 3. Practicable Test: This option involves loading a bulk carrier directly at the dock side, which minimizes concentrate re-handling and leads to improved safety and reliability. All locations where this could take place require dredging or causeway construction to allow for shore-side loading of bulk carriers. It is estimated that initially, 10 million cubic yards would need to be dredged, and another 10 million yards may need to be dredged over the life of the mine to maintain the design depth. Dredging operations for this option would increase impacts to Waters of the U.S., and requires the placement of dredge spoils. 4. Environmental Impacts Test: Dredging would have environmental impacts to marine habitat and shoreside habitat where dredged material would be placed; dredging would result in a higher volume of fill compared with other loading options such as lightering; maintaining the deep-draft navigation channel and turning basin would require annual maintenance dredging that would be a long-term effect. Shoreside loading would potentially lessen impacts to Endangered Species Act–listed species or habitat, including sea otter critical	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		habitat. ***Why Dismissed*** – This option would increase overall adverse impacts.	
Port Operations– Offshore Lightering – Amakdedori	ACC-022	***Origination*** – PLP Proposed Action ***Description*** – The lightering option is the Proposed Action developed by PLP, and requires approximately 15 feet of water depth at the dock, which can be achieved naturally at Amakdedori without dredging.	☑ Proposed ☐ Alternative ☐ Dismissed
Port Operations– Offshore Lightering – Iniskin	ACC-023	***Origination*** – The Iniskin Bay lightering option was developed as an alternative by PLP when looking at alternative port sites such as Diamond Point/Iliamna Bay (ACC-014). ***Description*** – Under this option, concentrate would be offloaded from trucks to transfer barges at port sites to be transported to lightering locations where larger transport barges would be moored. Concentrate would then be loaded to transport barges for transport across Cook Inlet. An additional mooring location from those identified in ACC-022 has been identified at Iniskin Bay, off the Iniskin Peninsula, which is closer to the Diamond Port site. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: The Iniskin Bay option has adequate water depth for the bulk carrier ships and affords good protection; it is a reasonable option. 3. Practicable Test: Similar to ACC-022. 4. Environmental Impacts Test: This option would have less environmental impact to the marine environment than a large dock facility. There would be less removal or placement of fill required. There is risk of material spills during transfer to/from lighter barges.	☐ Proposed ☑ Alternative ☐ Dismissed
Other Access Options –	ACC-024	***Origination*** – An option to require bridges at all anadromous stream crossings was suggested during scoping.	☐ Proposed ☐ Alternative

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Mandatory Bridges at Stream Crossings		***Description*** – This option would make it mandatory for bridges to be built any time the access route crosses a stream or river that supports anadromous fish. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Not reasonable, because Alaska Department of Fish and Game would specify the crossing requirements necessary to protect anadromous fish, which may be achieved by other means such as culverts rather than bridges. ***Why Dismissed*** – This option is not reasonable. Other forms of stream crossings such as culverts are often appropriate structures. The design and permitting process would select appropriate crossing structures to address the environmental concerns and reduce impacts.	☑ Dismissed
Other Access Options – Revised Project Alignment via Micro-Siting	ACC-025	***Origination*** – Consideration of micro-siting practices for the access roads was evaluated by USACE as a potential means to avoid environmental impacts. ***Description*** – Use micro-siting practices to avoid local impacts to wetlands, stream crossings, guiding, lodges, wildlife, visual resources, archeological, and historical resources. Avoid or minimize, or stay outside a buffer area important to resources. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This option is not reasonable to consider as a component of an action alternative for evaluation in the EIS because it lacks specificity, and is essentially mitigation. Additionally, the intent of this option would be accomplished as impact assessment is completed for the Draft EIS, resource agencies and the public review and comment on the Draft EIS, and the Applicant is asked to revise	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		the proposed project to better avoid and minimize impacts. Additionally, micro-siting practices would be demonstrated by the Applicant when they document the steps and measures they have taken to avoid and minimize environmental impacts of their proposed action. Mitigation measures included in PLP's design, which are integral components of the proposed action, will be included in Chapter 5 of the EIS, and will be considered during the NEPA impact analysis in the EIS for the proposed action and applicable components of other action alternatives. ***Why Dismissed*** – This option is not reasonable. Dismissal of this option would not preclude future consideration of micro-siting as mitigation to avoid or minimize specific impacts identified through the NEPA impact analysis, or as required by resource agencies during project permitting as the project design and permitting advances.	
Other Access Options – Summer Only Ferry Operations	ACC-026	***Origination*** – An option to restrict ferry options to the open water season was suggested during scoping. ***Description*** – Ferry would only be allowed to operate in the open water season when no ice-breaking is necessary. There would need to be infrastructure to allow ore stockpiling, an area identified for storage, and other logistical considerations associated with ceasing ferry operations during lake-ice conditions. ***Screening – This option is currently being evaluated.***	**Status under review**

Table B-1: Preliminary List of Project Options Being Considered

Concentrate Transport			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Concentrate Transport – Truck	CTR-001	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which involves containerized transport of ore concentrate by using the road and ferry access route (South Access Route (Road and Ferry): ACC-001). This option would use trucks to carry concentrate containers from the Mine Site. Concentrate would be transported to the port location, loaded onto a ferry, and re-handled at lightering locations. This option does not allow for the inclusion of a concentrate pipeline in the proposed project. This option may also be included with the North Option Route (Road and Ferry): ACC-003.	☑ Proposed ☐ Alternative ☐ Dismissed
Concentrate Transport – Pipeline	CTR-002	***Origination*** – Evaluation of an option for an ore concentrate pipeline was suggested during scoping due to concerns with ferrying ore concentrate across Iliamna Lake. ***Description*** – This option would not require the re-handling of cargo/concentrate, and allows for the inclusion of a concentrate pipeline in the proposed project. A single, approximately 7-inch-diameter steel pipeline with appropriate corrosion protection would be used to transport the concentrate. The concentrate pipeline and the gas pipeline would be co-located in a single trench at the toe of the road embankment, which would increase the average width of the road corridor footprint by 3 to 5 feet. Pump stations would be required to move concentrate through the pipeline. This option may be applied with North Access routes and considered with the South Access routes. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable option. 3. Practicable Test: This option is technologically feasible and would be an efficient way to move large volumes of material and reduce truck traffic. This option would require a water treatment plant (WTP) and a discharge permit at the port site, and would result in a small reduction (<1 cubic foot per second) in water available for discharge at the Mine Site. Treatment at the port site would remove toxic	☐ Proposed ☑ Alternative ☐ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Concentrate Transport			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		pollutants, including metals, to limits identified in an Alaska Department of Environmental Conservation (ADEC) and/or EPA discharge permit. Additionally, water depth and lake bed topography would likely preclude the use of a sub-lake gas pipeline along the South Access routes alignments or the lake portion of North Access Route 2. 4. Environmental Impacts Test: This route includes trade-offs in terms of the environmental impacts. This route would result in additional fill impacts associated with a wider corridor, but reduced trucking. This option is carried forward as an alternative to be considered in detail in the EIS.	
Concentrate Transport – Rail	CTR-003	***Origination*** – Transporting ore concentrate by rail was evaluated by PLP when developing the proposed project design. ***Description*** – This option would require the construction of a railroad from the Mine Site for the transportation of ore concentrate. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Rail transport is a reasonable option to consider. 3. Practicable Test: Construction of a railroad to move the volume of materials necessary for the proposed project would not be efficient or cost effective. The cost to construct railroads in Alaska is about five times the cost to construct roads. Railroads grades are typically limited to grades of 1 percent or less, with longer bridges. The additional cost of the track, railroad ballast, hardware, and associated equipment is a significant investment. Railroad construction in Alaska costs roughly $9 million per mile; remote road construction costs roughly $1.7 million per mile. Railroads can provide greater efficiencies where high volumes of materials are transported daily, but the total volume of transported materials	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Concentrate Transport			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		projected for the Pebble Project is low compared to typical railroad operations. Transport of concentrate, fuel, reagents and consumables is estimated to be 35 truck round trips per day for the project. The high cost to construct a railroad for the relatively low volume of freight would not be cost effective. ***Why Dismissed*** – This option would increase overall adverse impacts. It may not be practicable to achieve grade requirements.	

Table B-1: Preliminary List of Project Options Being Considered

Reclamation and Closure Access			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Closure – Retain Mine Road	RCA-001	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which includes using and maintaining mine access roads for all mine reclamation and closure transportation needs after operations. This option uses the existing infrastructure for mine access during post-closure support activities.	☑ Proposed ☐ Alternative ☐ Dismissed
Closure – Iliamna Airport and Existing Roads	RCA-002	***Origination*** – This closure option was evaluated by PLP when developing the proposed project design. ***Description*** –This option would use existing infrastructure (Iliamna airport and Pile Bay-Williamsport Road) for all mine reclamation and closure transportation needs after operations. The mine access road would be reclaimed. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This closure option is a reasonable option to consider. 3. Practicable Test: This option uses Iliamna airport and/or the existing Pile Bay road; however, neither have the capacity to meet the post-closure logistical requirements. The existing Pile Bay Road, if used as part of an alternative, would not by itself meet the ground transportation needs for reclamation and closure if other access roads are not maintained. The option would rely on helicopter transport of fuel, materials, WTP reagents, and supplies between the Iliamna Airport and the Mine Site. This means of transportation would be inefficient, very expensive, and less safe than trucking using the mine access road. ***Why Dismissed*** – This option is not practicable in terms of logistics because the existing infrastructure would not support the reclamation and closure transportation needs.	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Tailings Management			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Storage Method– Thickened Tailings Storage	TSF-001	***Origination*** – PLP Proposed Action ***Description*** – Thickened tailings storage is the Proposed Action for bulk tailings. The option is not suited for pyritic tailings that need to remain saturated to prevent them from oxidizing and generation ARD and metals leaching. Thickened tailings are slurry tailings that have been mechanically dewatered, sometimes with settling additives, to create a more viscous, molasses-like material. Thickened tailings typically have a solids content (mass of solids to total mass of the combined solids and liquid mixture) of 45 to 65 percent. They are piped to the TSF by centrifugal pumps or positive displacement pumps, depending on the topography, distance, head loss, and viscosity. They still require an embankment dam for containment: either a full dam like those used for slurry tailings, or a lower dam, depending on the viscosity. These dams need to be periodically raised to hold the tailings and supernatant water. Some mines discharge thickened tailings from the dam and create a slurry tailings type of TSF with a steeper beach. Other mines discharge thickened tailings from a central tower to produce a cone-shaped TSF with a tailings surface sloped towards the dams. Thickened tailings do not segregate as much as slurry tailings, so that they have relatively consistent particle distributions across the TSF. The yield strength (applied pressure that must be exceeded to make the fluid flow) of the consolidated tailings is 0.4 to 1.6 pounds per square foot (psf), partly depending on the degree of initial thickening.	☑ Proposed ☐ Alternative ☐ Dismissed
Storage Method– Slurry Tailings Storage	TSF-002	***Origination*** – This option is the Proposed Action for the pyritic tailings, and was considered by PLP for the bulk tailings. ***Description*** – Slurry tailings are a slightly dewatered product of the milling process. The slurry is a water-like material that is moved by pipeline to the TSF. The slurry typically has a solids content of 10 to 40 percent, and can flow down-gradient by gravity, or be moved by centrifugal pumps, depending on the topography, distance, and head loss. The high water content requires that the tailings be stored behind a dam that must be periodically raised to hold the tailings and supernatant water. The tailings gradually segregate as they flow away from the discharge, with coarser particles closest to the discharge points and finer particles further away. A beach slopes away from each	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Tailings Management			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
		discharge point to the supernatant pond. The tailings consolidate to a yield strength of up to 0.4 psf. The supernatant water is removed to the extent possible, and reclaimed for mill use, or treated and discharged. Some mines use cyclones to split the slurry into coarser and finer fractions, and use the coarser fraction as dam raise fill. ***Screening*** **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable tailing method to consider. 3. Practicable Test: Slurry tailings are the most common method of tailings disposal, and have been successfully produced and managed under a wide range of operating conditions for both bulk and pyritic tailings. The feasibility of this method is reliable, and proven at the proposed Pebble Project scale under these environmental conditions. 4. Environmental Impacts Test: Slurry TSFs entrain more water and have larger supernatant ponds than thickened tailings TSFs. Therefore, they have more potential energy than thickened tailings, and pose a greater risk to the environment should there be an operational problem or a dam failure. PLP has proposed thickened tailings to conserve water and reduce this risk (TSF-001). ***Why Dismissed*** **–** This option would increase overall adverse impacts.	
Storage Method– Paste Tailings Storage	TSF-003	***Origination*** **–** Paste tailings storage was suggested via scoping comments as a potentially efficient and effective method of storage. ***Description*** **–**This option is only applicable to the bulk tailings, and not the pyritic tailings that would need to stay saturated to prevent ARD generation and metal leaching. Paste tailings are essentially thickened tailings, thickened with high-density thickeners, cement, and other additives to a toothpaste-like material. They typically have a solids content of 60 to 75 percent, and a yield strength of 1.6 to 2.0 psf. They are typically moved by pipeline, but require positive displacement pumps. Paste tailings particles do not	☐ Proposed ☐ Alternative ☑ Dismissed

Table B-1: Preliminary List of Project Options Being Considered

Tailings Management			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
		segregate, so tailings characteristics would be relatively uniform throughout the TSF. However, paste tailings are mostly used as backfill in underground mine workings where transport and placement of the paste is aided by gravity, and are typically not disposed of in TSFs. ***Screening*** **–** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: TBD. 3. Practicable Test: Paste tailings require specialized high-density thickeners, and are the least common TSF. Positive displacement pumps are usually required for transportation to the TSF site, resulting in potential plugging of pipelines with high-density tailing and increased pumping energy requirements. Producing a consistent paste would be a major challenge with the processing, because small changes in the orebody, especially clay-sized particles, can greatly influence the paste characteristics, such as yield strength and beach slope. 4. Environmental Impacts Test: Paste tailings require additional transportation infrastructure and on-site facilities for handling cement and other thickeners, which would require a large footprint and added impact to the environment. The method would produce a more stable TSF than slurry tailings, but essentially offers no more environmental benefits than the proposed thickened tailings. ***Why Dismissed*** **–** Paste tailings are mostly used in underground workings, and have minimal surface TSF history and interest. A paste TSF would provide essentially no meaningful environmental benefit above that of the Proposed Action.	
Storage Method– Dry Stack Tailings (for Bulk	TSF-004	***Origination*** **–** This storage method was evaluated by PLP when developing the proposed project design. ***Description*** **–** This option of dry-stack tailings is only suited for bulk tailings because the pyritic tailings need to stay saturated to prevent ARD generation and metal leaching.	**Status under review**

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Tailings Management			
Option	**Option #**	**Option Details and Screening** ❖ **Option Details: Origination, Description** ❖ **Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test** ❖ **Why Dismissed (as applicable)**	**Status**
Tailings only)		Filtering tailings removes water using mechanical filters, and results in tailings with 75 to 85 percent solids content, and a yield strength of over 3 psf. This creates a soil-like material or "dry cake" that is transported by conveyor or truck to a "dry stack" TSF. These TSFs do not require dams, unless possibly for perimeter berms. The tailings are placed by bulldozers and compactors, as is done in conventional earthwork construction. ***Screening – This option is currently being evaluated.***	
Storage Method– Submarine Disposal Storage	TSF-005	***Origination*** – This storage method was evaluated by PLP when developing the proposed project design. ***Description*** – This option would place the tailings and other mine waste in a water body such as in a lake or seawater to maintain a saturated condition into perpetuity. The concept is to discharge tailings by gravity to a location and depth where they are less likely to oxidize and leach out toxic metals, and where marine life is less abundant. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This option would maintain PAG material in a saturated condition without the need for an on-land TSF and maintenance of dams and other water control features. However, there are concerns about performance histories of previous and current submarine disposal operations. It is likely not possible to obtain permits for storing tailings in an existing waterbody in or near Bristol Bay in addition to significant public opposition to the storing of bulk tailings in water bodies in general. This is not a reasonable option. ***Why Dismissed*** – This option is not reasonable.	☐ Proposed ☐ Alternative ☑ Dismissed
Storage Method– Remove or	TSF-006	***Origination*** – This method was proposed via scoping comments as a measure to reduce local environmental impacts due to tailings storage. ***Description*** –This option would involve transporting all of the tailings from the project	☐ Proposed ☐ Alternative ☑ Dismissed

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Tailings Management			
Option	**Option #**	**Option Details and Screening** ❖ Option Details: Origination, Description ❖ Screening Criteria: 1. Purpose and Need Test, 2. Reasonable Test, 3. Practicable Test, 4. Environmental Impacts Test ❖ Why Dismissed (as applicable)	**Status**
Make All Tailings Inert		area to another disposal area, or making the tailings inert to eliminate the ARD and metal leaching potential. ***Screening –*** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Trucking tailings away from the project area is not reasonable because it would require round-the-clock transport. The project would generate tailings at a rate that would require a truck with triple trailers to leave the Mine Site approximately every minute. This would require new roads to connect to the existing road system. The costs to transport the tails hundreds of miles would be exorbitant and cost prohibitive. Treating the tailings appears to be a reasonable option to consider. 3. Practicable Test: Treating the pyritic tailings to make them inert (the bulk tailings are considered inert) would require additional treatment facilities that would need space in the project area, and would introduce new containment structure needs. Methods of making tailings inert include separating pyritic tailings to create a larger bulk TSF and smaller pyrite TSF (this is already the proposed action); returning the pyritic tailings to the completed pit at closure to allow natural subaqueous storage (this is also already the proposed action); adding cement to create a cementitious-type material; buffering by mixing in alkaline material like crushed limestone to neutralize the acidity; and refining processes to extract more metals and reduce their metals content in the tailings. 4. Environmental Impacts Test: Treating the tailings to make them inert by separating the bulk and pyritic tailings and returning the pyritic tailings to the completed pit at closure is the Proposed Action. Adding cement or limestone to make tailings inert would require the transport of very large volumes of these additives, including possibly developing quarries; and constructing additional	

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Tailings Management			
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		infrastructure and treatment facilities in the project area. Revising mining methods to extract richer ore would result in more waste rock with higher ARD and metal leaching potential. Treatment facilities and associated containment structures would require additional space, with resultant increased environmental impacts. ***Why Dismissed*** – The option to move the tailings to another area is not reasonable. Treating the pyritic tailings with cement or limestone provides no environmental benefits over the Proposed Action, which would separate the pyritic from the bulk tails and keep them inert by maintaining them during mining in a subaqueous condition, and return them to the completed pit during closure for permanent subaqueous storage.	
Storage Method– Truck Tailings to Canada	TSF-007	***Origination*** – Evaluation of an option to truck all waste to Canada was suggested during scoping. ***Description*** –This option would involve transporting all of the tailings from the project area to a disposal area in Canada. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: Trucking tailings away from the project area is not reasonable because it would require round-the-clock transport. The project would generate tailings at a rate that would require a truck with triple trailers to leave the Mine Site approximately every minute. This would require new roads to connect to the existing road system. The costs to transport the tails hundreds of miles would be exorbitant and cost prohibitive. ***Why Dismissed*** – This option is not reasonable and is cost prohibitive.	☐ Proposed ☐ Alternative ☑ Dismissed
Tailings Dam – Centerline	TSF-008	***Origination*** – PLP Proposed Action	☑ Proposed ☐ Alternative

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Construction		***Description*** – This option is part of the Proposed Action, which includes the use of centerline construction for the bulk tailings TSF embankment. Centerline construction optimizes the robustness and stability advantages of downstream construction, with the efficiency advantages of upstream construction. The centerline dam begins with a starter dam, and subsequent raises are placed directly above the starter dam or previous raise, and over the downstream face, and over the tailings adjacent to the dam. The centerline of the dam crest is maintained in the same vertical plane. The outer part of the dam expands downstream as the dam is raised. The inner part of the dam has raises that stagger over the tailings with the upstream toe of each raise on the same vertical plane. A variation of the centerline method is to bend the centerline in either the upstream or downstream direction to optimize stability and cost. Centerline dams can be built out of rock, soil, and tailings.	☐ Dismissed
Tailings Dam – Downstream Construction	TSF-009	***Origination*** – This construction method was evaluated by PLP when developing the proposed project design. ***Description*** – Under this option, downstream tailings dam construction is considered only for the bulk TSF instead of the centerline method (the pyritic TSF is proposed as a downstream dam). Downstream tailings dams can be constructed using rock, soil, or tailings in various combinations. Construction starts with a starter dam in the same way as for a centerline dam. Subsequent stages (raises) are built on top of the downstream slope of the previous dam. The centerline of the dam crest moves downstream. Downstream dams are constructed in the same way as conventional water storage dams, except for being raised in stages as mining progresses, instead of all at once. ***Screening – This option is currently being evaluated.***	**Status under review**
Tailings Dam – Upstream Construction	TSF-010	***Origination*** – This construction method was evaluated by USACE. ***Description*** – Tailings dams built by the upstream method of construction are raised by using rock, soil, and tailings in various combinations as dam fill. A starter dam is first built in the same manner as a centerline or downstream dam. Trapezoidal-shaped raises are built on top of each other at an offset toe-to-crest design, moving the dam crest and	☐ Proposed ☐ Alternative ☑ Dismissed

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Tailings Management			
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		centerline upstream so that the upstream part of the dam is situated over tailings in the TSF. ***Screening –*** 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider alternative dam construction methods. 3. Practicable Test: Upstream raises are the oldest and most economic type of tailings dam construction. An upstream dam contains about one-third of the fill volume of a downstream dam, and one-half the volume of a centerline dam. This would result in construction time savings conducive to the project's short construction seasons, and therefore, reduced costs. However, fill can only be placed on tailings that have had time to consolidate, and thereby provide a strong foundation for the raises. Otherwise, the underlying tailings could be saturated to the extent they could liquefy as a result of seismic activity and cause the dam to fail. A rate of tailings rise of 15 to 30 feet per year is considered to be the upper limit of allowing sufficient time for tailings consolidation to provide a stable tailings foundation for upstream raise construction. The planned rate of tailings rise for the Pebble Project is at the upper end of this range, and likely too fast to allow enough time for consolidation. Therefore, an upstream raise is likely not feasible because of the fast rate of tailings rise and liquefaction potential in a high-seismic-potential area. 4. Environmental Impacts Test: The need for less dam material means less material needs to be quarried or borrowed for dam fill, resulting in less environmental impacts. However, the higher potential for tailings liquefaction results in a higher risk of dam failure, and inundation of the land and water	

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Tailings Management			
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		bodies by tailings. ***Why Dismissed*** – PLP is proposing a centerline dam for the bulk TSF and downstream dam for the pyritic TSF, which are considered more stable construction methods and reduce the risk of dam failure. Upstream construction is dismissed from further consideration because of potential environmental impacts from a higher risk of dam failure.	
Storage Method – Emergency Storage for TSF	TSF-011	***Origination*** – Scoping comments expressed concern regarding the stability and environmental impacts of a TSF failure due to an unexpected event such as seismic activity or unexpected water volumes. ***Description*** –This option would require an emergency storage/overflow containment area to minimize risk of tailings spills from excessive buildup of water in the TSF. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: The dam design would require that the dams accommodate a 200-year flood event when the TSF was at maximum capacity (both events at the same time). An emergency storage facility would provide redundancy, but at the expense of having to build a separate facility that would require the disturbance and use of additional land. Any redundancies that could be achieved would be more economically achieved by more robust TSF, WMP, seepage collection, and sediment pond facilities. The concerns this option are intended to address are already designed into the proposed project, so this option is not reasonable. ***Why Dismissed*** – The option is not reasonable because the suggestion is already part of the proposed project.	**Status Under Review**

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Tailings Management			
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Tailings Production – Segregated Bulk/Pyritic Tails	TSF-012	***Origination*** – PLP Proposed Action. ***Description*** – This option is part of the Proposed Action, which involves keeping both bulk and pyritic tailing streams separate. Separate tailings streams are a by-product of the mining process, so no additional steps are required. This option would require separate TSFs for bulk and pyritic tails.	☑ Proposed ☐ Alternative ☐ Dismissed
Tailings Production – Blended Bulk/Pyritic Tails	TSF-013	***Origination*** – This option was evaluated by PLP as a potential tailings production and storage method. ***Description*** – Under this option, bulk and pyritic tailings streams would be combined into one for the purpose of having a single TSF. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This is a reasonable option to consider. 3. Practicable Test: This option requires an additional step to blend tailings streams, and maintain more water in the TSF to keep the pyritic tailings subaqueous to mitigate ARD and metal leaching potential. The entire facility would need to be managed in perpetuity to maintain the wet closure, and to collect and treat seepage. A blended facility would also need to be lined, which would hinder the flow-through design concept of the bulk TSF, and thereby prevent the bulk tailings from dewatering over time and becoming a stable landform. 4. Environmental Impacts Test: The blended tails would result in a large volume of tailings—and therefore, seepage water— that would need to be managed for potential ARD metal leaching. The wet closure would have a long-term post-closure dam failure risk higher than the proposed project. ***Why Dismissed*** – This option would increase overall adverse impacts because the	☐ Proposed ☐ Alternative ☑ Dismissed

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Tailings Management			
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		pyritic tails would "contaminate" the bulk tails and require subaqueous storage in perpetuity.	
Bulk Tailings Basin –Unlined	TSF-014	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which would discharge thickened bulk tailings into an unlined basin, and provide TSF solids and water management in a manner that results in the TSF groundwater level sloping down towards the main embankment, and the seepage passing through a collection system built under the main embankment, and being collected by the bulk TSK main seepage collection pond.	☑ Proposed ☐ Alternative ☐ Dismissed
Bulk Tailings Basin – Lined	TSF-015	***Origination*** – This option was evaluated by PLP when developing the proposed project design. ***Description*** – This option has the bottom of the bulk TSF fully lined so that the bulk tailings would not be in contact with the ground surface. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: TBD 3. Practicable Test: It would be possible to fully line the bulk TSF although it would increase costs. However, lining of the bulk TSF would create a bathtub of water in the lower part of the TSF, because the liner would impede the planned flow-through of seepage through the tailings and main embankment. This would result in saturated lower tailings that could be susceptible to static and seismic liquefaction during operations, and through closure and post-closure, even in thickened tailings several hundred feet deep. Technologies have been evaluated to connect drains into bottom liners to enhance seepage, but they have not been proven and implemented on a similar scale.	☐ Proposed ☐ Alternative ☑ Dismissed

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Tailings Management			
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		4. Environmental Impacts Test: This option would result in poor consolidation of tailings that would lead to long-term saturation of the deeper tailings, and susceptibility to static and seismic liquefaction. This would defeat the drainage objective of the proposed thickened TSF. The ultimate result would be higher potential mobility of the tailings, and prevention of the tailings from consolidating over time by gradual drainage, and ultimately becoming a stable landform as proposed. ***Why Dismissed*** – This option would increase overall adverse impacts because the liner would retain water in the bulk tails and increase the risk of dam failure and tailings mobility.	
Pyritic Tailings Basin – Lined	TSF-016	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, which has the bottom of the pyritic tailings TSF fully lined so that the pyritic tailings would not be in contact with the ground surface. Additionally, this option allows for pyritic tailings to be stored sub-aqueously without the circulation of seepage water.	☑ Proposed ☐ Alternative ☐ Dismissed
Pyritic Tailings Basin – Unlined	TSF-017	***Origination*** – This option was evaluated by PLP when developing the proposed project design. ***Description*** – Under this option, the pyritic TSF would be unlined. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider an unlined facility. 3. Practicable Test: It is practicable with existing technology to build an unlined TSF, and it would reduce costs. 4. Environmental Impacts Test: PLP has proposed a lined pyritic TSF to allow subaqueous storage during operations. The liner would also reduce the volume	☐ Proposed ☐ Alternative ☑ Dismissed

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		of pyritic tailings–contaminated seepage from the facility that would need to be collected and treated. PLP has also proposed to move the pyritic tails and PAG waste to the completed pit at closure, and reclaim the TSF; eliminating the need for the pyritic TSF to be perpetually maintained. ***Why Dismissed*** – This option would increase overall adverse impacts.	
TSF Location – NFK West TSF Location	TSF-018	***Origination*** – PLP Proposed Action ***Description*** – This option is part of the Proposed Action, and would store the bulk tails 2 to 3 miles west of the proposed pit. The pyritic tails would be stored at the NFK East location (TSF-021).	☑ Proposed ☐ Alternative ☐ Dismissed
TSF Location – NFK North TSF Location	TSF-019	***Origination*** – This TSF location was evaluated by PLP when developing the proposed project design. ***Description*** – This option would store pyritic tailings about 2 miles north of the proposed open pit. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: This location has been studied previously and is a reasonable option to consider. 3. Practicable Test: This site is close to the process plant, has sufficient storage capacity for all tailings, and allows for the segregation of bulk and pyritic tailings. This option has the highest efficiency, making it the least costly option. 4. Environmental Impacts Test: The catchment area of the site is high, and the total anadromous stream miles impacted, as well as impacted acres of wetlands for this site, are high. ***Why Dismissed*** – This option would increase overall adverse impacts.	☐ Proposed ☐ Alternative ☑ Dismissed

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TSF Location – NFK East TSF Location	TSF-020	***Origination*** – PLP Proposed Action ***Description*** – This location is proposed by PLP to store the pyritic tailings about 1 mile west of the proposed open pit. The bulk tailings would be stored at the NFK West location (TSF-019).	☑ Proposed ☐ Alternative ☐ Dismissed
Combined TSF and Operating Pond	TSF-021	***Origination*** – This option was evaluated by USACE to avoid impacts associated with a separate water management pond. ***Description*** – This option would add the Operating Pond (part of the main water management pond) to the bulk TSF. It would result in additional water stored in the bulk TSF, and would eliminate the need for or reduce the size of the main water management pond. The objective would be to perform all bulk tailings and water management operations at one facility, instead of two facilities. ***Screening*** – 1. Purpose and Need Test: Meets the purpose and need. 2. Reasonable Test: It is reasonable to consider options that potentially reduce the footprint. A combined pond is proposed for the Donlin Gold Mine. 3. Practicable Test: This option is compatible only with the slurry tailings disposal method (TSF-002). The option is not compatible with the thickened tailings disposal objective of ultimate drainage and consolidation of the tailings to a stable landform. Production of thickened tailings requires the dewatering of tailings as part of the milling process. The bulk TSF is planned to store thickened tailings that have been previously dewatered to the extent that they would be discharged to the bulk TSF at a solids content of 55 percent. This plan would result in a drier and more stable tailings deposit than would result from slurry tailings discharge. A combined bulk TSF/Operating Pond facility could be achieved by either not thickening the tailings, and thereby depositing slurry tailings; or building an internal embankment in the combined facility to separate	**Status under review**